GAS JOURNAL, NOV. 6, 1946

VOL. 248 98th YEAR No. 4355

CONVERGING INDUSTRIES

THE Annual General Meeting of the Coke Oven Managers' Association and the speeches at the luncheon which followed it contained much of extreme interest to the Gas Industry. Mr. Shinwell, indeed, made statements regarding the future of the carbonizing industries more definite in character than any that we have heard him make before. The future plan of coal utilization by carbonization appears to be taking shape, thanks to advice given to him from many quarters, including the gas and coke oven industrialists who will have to work the new machine that is being constructed.

The new President of the C.O.M.A. crystallized in his Address many views that have been taking shape during the past year or two. He roundly declared that coking is no part of the job of mine management, and asked that it should be divorced from the work of the colliery manager and colliery agent. Mr. Shinwell appeared to accept this view, and in his speech at the luncheon declared that colliery managers and engineers would have their hands full with their own business of coal mining, without dissipating their energies by interfering with carbonization and other forms of coal processing. On the other hand, Lord Hyndley is clearly charged with the job of administrating the coke oven industry. He announced that the National Coal Board will treat coke making *as an industry*—not as a part of the pithead operations of mining. As if to make assurance doubly sure, he stated that Mr. L. O'Connor, the Controller of Hard Coke during the war, is to occupy the post of Administrator of the Coking Industry. This part of the picture, therefore, seems clear. There will be an integrated coke oven industry owned by the nation, operated by the National Coal Board, functioning as a single entity under a single management.

The inferences from what was said may go further than this. The coke oven industry is to be re-organized, modernized, and expanded. Lord Hyndley said that there is to be a long-term policy for coking and by-products manufacture. The industry, he said, will require a very thorough overhaul. There is a curious delusion in many quarters, and not least in certain quarters in the Gas Industry, that the coking operation, as now conducted, is a little primitive. Nothing could be further from the truth. The thermal efficiency of carbonization in the modern coke oven, well-designed and well-operated, is equal to that of an efficient gas retort, when both are fired by producer gas. There are, it is true, many coke oven batteries that are in sad need of overhaul, of drastic re-building, and even of consignment to the scrap heap. The toll of war has been not less serious in that industry than it has been in the Gas Industry. Building has not been undertaken; repairs have been of the slightest. The President, in his Address, pointed out that "the coking installations in operation at collieries where the life of many batteries is nearing the end, and where the standard of efficiency, particularly in the release of surplus gas, is low, call for a new building programme." As we have mentioned, Lord Hyndley said that as part of his long-term policy "the industry will require a very thorough overhaul." He added that the National Coal Board "might have ideas about centralization." This hint suggests that a great many of the smaller, older, and less economic plants will be scrapped and that large central plants may be erected based on pit-head carbonization. Mr. Pearson, speaking as President of the Institution of Gas Engineers, commented that it was an anachronism that coke oven gas should be used for heating the ovens at this stage in our industrial development, and suggested that producer gas generated from coke should be used in the new plants, thus releasing the gas for town use. From these comments it may be deduced that the Gas Industry cannot be insensible to the developments which are likely to take place in the coke oven industry over the next few years. Pithead carbonization will become a factor to be reckoned with.

A QUESTION OF LIAISON

IT is apposite to quote a passage from the President's Address: "It is interesting to examine the relationship of our industry to that of kindred industries, and particularly the Gas Industry. It is obvious that the two industries could and should work side by side, in so far as the base products of coke, tar, and gas are concerned. The same carbonizing principles to all intents and purposes fill the needs of both industries, as any quality of product can be made in the system depending on plant design, quality of coal used, and rate of heating. One must, therefore, ask why it is that the two industries are divided, or, rather, why cannot the two industries be as one, particularly since the coke oven industry is already contributing to the manufacture of domestic coke and also to the domestic gas requirements." This proposal is reminiscent of that for a Central Carbonization Board on the lines of the Central Electricity Board put forward by Dr. Foxwell some 18 months ago, and of his more recent Paper to the Southern Association of Gas Engineers and Managers in which he emphasized that the implementation of the report of the Fuel and Power Advisory Committee on Domestic Heating would require the united effort of all producers of smokeless fuel. Mr. Shinwell appears to have something of the same sort in his mind. He pointed out that in due course the Gas Industry would be nationalized and he hinted that careful consideration

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must be given to the form of organization which would best fit the development of carbonization in this country. His words will be found in our columns in this issue; the impression they created upon our mind was that the reorganized Gas Industry and the nationalized coke oven industry might conceivably be brought eventually under a single ownership. The Minister has asked for the help of everyone; this is an occasion when help will be needed.

The development of coal processing will not stop in its present stage. Mr. Shinwell said that he expected Sir Charles Ellis, as Scientific Director of the National Coal Board, to proceed with research and with the co-ordination and application of research into all matters relating to coal utilization. Lord Hyndley emphasized that the future conduct and expansion of the industry will be based on research and the application of science. Clearly, coal utilization is about to enter a phase in which technicians and scientists will play a larger part than ever before. In the past the coking industry has made use of whatever developments constructional companies have been able to devise, and in that way a considerable, and indeed striking, series of advances has been made in the design of existing plant. Real technical progress, however, in the sense of development of new processes and new industries based on coal carbonization or on other forms of coal utilization, has been almost completely absent. This, we suggest, has been because coke ovens have been under the wrong management. The policy of the industry has been laid down by those who were primarily colliery directors and who had not had the training or experience necessary to manage what is, in essence, a chemical industry. Much of the difficulty which undoubtedy has existed in the past between the coke oven side of carbonization and the Gas Industry has been due to a different and fundamental outlook and method which could only be dissolved by a change of ownership. Perhaps through the operations of the British Coking Industry Association, this change of outlook would ultimately have come about under private enterprise. Mr. Shinwell has taken a short cut towards the same end. The result is bound to be a considerable shaking up of ideas not only in the coke oven industry but in allied industries, including the Gas Industry, tar distillation, and certain branches of the chemical industry. The research organization of the coking industry is admittedly weak and it would be useful if the Gas Research Board were to be expanded in collaboration with Sir Charles Ellis to undertake research into new developments in the processing of coal. The Gas Research Board has already gone so far in getting away from the traditional methods of coal carbonization that it would seem unfortunate if a second authority were set up to do similar work.

CHEMICALS FROM COAL

So much for the major problems of reorganization of the gas and coke oven industries. We duly noted what Mr. Shinwell had to say about the export of coal. Mr. Wakefield Adam at a recent meeting of the Institute of Export urged that we should stop exporting coal, particularly so long as there was a coal shortage in this country. He also suggested the general use of smokeless fuel for domestic purposes. Mr. W. L. Boon at the same meeting emphasized the need for taking measures to avoid the great wastage of fuel in all forms which is to be found throughout British industry; and the case was put forward for the production of chemicals from coal and the building up of a chemical industry based on coal. It was pointed out that coal is a diminishing capital asset and that our exports should be of products manufactured from coal involving in their production the maximum of British brains and British labour. Mr. Shinwell, in his speech at the C.O.M.A. luncheon, expressed the same view. He said that not only would he not export coal in the present circumstances but that his policy would be to "plough coal back into British industry," rather than to export it abroad. In so far as it is practicable to turn our coal into other products of value he would do that in place of exporting it. Pressure from the Board of Trade and the Treasury will, no doubt, be too strong to permit any Minister of Fuel and Power to place an absolute ban on coal exportation for the time being, but it is necessary to legislate for the future and not for the present only.

PROFESSIONAL STATUS

THE problem of the future professional status of the Coke Oven Managers' Association has come prominently to the fore during the last year or two. It may be suggested that the present emergency has caused the Council of the Association to look rather anxiously into the technical qualifications of their members. It is certain that those qualifications are not of a uniformly high standard because the qualification for admission to the Association is the job a man holds and not his technical qualifications for that job. The Coke Oven Managers' Association has never had a proper educational scheme and it has never been a qualifying body. There have been heard recently proposals from the members that it should become a qualifying body, and those proposals were heard again during the annual general meeting on which we comment. In his Presidential Address last year, Mr. W. Neville Warwick pointed out that "membership of a professional institution should be a guarantee of training, ability, and competence—wider than that required for any particular industry." Deploring the rather numerous professional bodies that exist Mr. Warwick visualized "eventual affiliation into a parent body with a title like 'The Institution of Carbonizing Engineers' for all people engaged in the thermal treatment of coal. . . Such an institution should enhance professional status, broaden horizons, and increase the range of opportunity for advancement."

Mr. Phillipson, in his Address this year, has proposed common educational systems for the Ministry of Fuel and Power, the Institute of Fuel, the Institution of Gas Engineers, and the C.O.M.A. He says: "The industry's requirements are becoming more and more standardized and it should not be impossible to lay down a curriculum specially to cover the essential features of coal processing and utilization, &c., which would serve as a common basis for entry into all of these Institutions and Associations. Each individual Association or Institute could still preserve its own identity by any specialized training it thinks desirable. What is there to prevent the Associations amalgamating? The interests are identical and industrial activities are to all intents and purposes the same, and since it would appear that both sections are to be absorbed in a general national project, it seems to be an obvious solution for the Associations to become one authoritative body acting for the industry."

Mr. Pearson, speaking as President of the Institution of Gas Engineers, pointed out that it is already open to individual members of the C.O.M.A. to join the Institution of Gas Engineers if they are qualified to do so within the terms of the Charter and By-Laws. Because, however, a number of the present members of the C.O.M.A. would not be so qualified he did not reject the possibility that some special arrangement might be made for affiliation to the Institution of Gas Engineers. It has been suggested that it should be equally possible for an affiliation to take place with the Institute of Fuel. A good deal more may be heard in the near future of these proposals. Coal utilization is becoming a single subject, having many different phases. The Institute of Fuel and the Institution of Gas Engineers are

both Chartered bodies and one would not suggest complete amalgamation. They already work in close collaboration and it may well be that means will be found in the future of making this collaboration even closer. The Coke Oven Managers' Association is small in numbers and the view has been heard that it would exercise greater authority and influence in industrial affairs if it were to be an integral part of a larger body, while preserving its identity as a specific section of that body.

Gas Engineers' National Guild

Response to the call for enrolment in the new Gas Engineers' National Guild has varied considerably in different parts of the country, but the total number of eligible gas engineers who have so far applied for membership falls a very long way short of the 85%—a figure mentioned at one of the District Association meetings—which we quoted last week. Mr. J. M. McLusky, Hon. Secretary and Treasurer, informs us that up to last week-end the membership had reached only 34% of the possible total. Of those eligible for membership, however, it may be assumed that many have already retired, others are approaching retiring age, and some, by nature of their work with contracting firms, &c., may not feel inclined to join the Guild. The actual membership may therefore be well above the percentage given by Mr. McLusky, but it is still considerably short of the strength necessary to make the Guild a completely effective and representative organization. Mr. McLusky hopes that the many eligible gas engineers who have not yet joined will see their way to do so in increasing numbers in the very near future.

Diary

Nov. 9.—Yorkshire Junior Gas Association: "Purification," N. B. Biggs. Grand Hotel, Sheffield, 2.30 p.m.

Nov. 11.—Women's Gas Council: Executive Committee, Gas Industry House, 1 p.m.

Nov. 11.—Eastern Association of Gas Engineers and Managers: Autumn Meeting, Grosvenor House, Park Lane, W.1. Luncheon, 12 noon for 12.15 p.m.; Meeting, 1.45 p.m.

Nov. 12.—Midland Junior Gas Association: Films, "Steam," and "Pluto," Gas Offices, Wolverhampton, 6.30 p.m.

Nov. 12.—British Gas Council: Central Board. Gas Industry House, 2.30 p.m.

Nov. 12.—National Federation of Gas Coke Associations: General Committee, Gas Industry House, 10 a.m.

Nov. 13.—Domestic Development Committee, Gas Industry House, 2.30 p.m.

Nov. 13.—Institute of Fuel (North Western Section): "The Distribution of Ash in British Coals and its Bearing on the Economics of Coal Cleaning," Dr. E. S. Grumell. Manchester, 2.30 p.m.

Nov. 15.—London and Southern District Junior Gas Association: "Recent Developments in Radiant Heating for Industrial Purposes," R. F. Hayman. 7 p.m.

Nov. 15.—Industrial Gas Development Committee. Gas Industry House, 10 a.m.

Nov. 18.—London and Counties Coke Association: Finance Committee, 11 a.m.; Executive Committee, 11.30 a.m.; Central Committee, 1.30 p.m. Gas Industry House.

Nov. 19.—Southern Association of Gas Engineers and Managers (Eastern District): "Modern Trends in Gas Fitting Practice," R. N. LeFevre, Officer in Charge of Training, Watson House. Gas Industry House, 2.30 p.m.

"JOURNAL" SUBSCRIPTION RATES.

From the end of this year the prepaid annual "JOURNAL" subscription rates will be, Inland 45/-; Overseas 52/-. The half-yearly credit rate will be 27/-.

"JOURNAL" subscription rates have remained unaltered since 1919, although the question of raising them has often been considered. Now we have received an increase in our paper ration which will enable us to increase the average size of the paper and it is our intention to expand the editorial service still further as conditions allow. Added to this expanded size and service, production costs — printing, paper and blocks — have risen steeply in recent years and a further printing increase has just been notified to us. Now, for the first time in 30 years, we ask our readers slightly to increase their contribution towards meeting the costs of providing an enlarged and better "JOURNAL."

Personal

Mr. W. A. M. STEWART, Lichfield, has been appointed Engineer and Manager to Armadale Gas Company. Mr. Stewart, who is a native of Kirkintilloch, has held appointments at Linlithgow and Maryport.

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Mr. S. T. JONES, Engineer and Manager of the Oswaldtwistle Gas Department, has resigned to take up a similar post at Leek, Staffordshire. Mr. Jones has been Manager at Oswaldtwistle for eight years.

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Mr. PHILIP C. SPENCER, who has been associated for many years with Mr. H. King Hiller, whose death we recorded last week, is taking over the management of the Hewitt Construction Syndicate, Ltd., of which he is a Director. The business will continue as hitherto at 39, Victoria Street, S.W.1.

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Mr. A. WHITFIELD has been appointed by E. Boydell & Co., Ltd., manufacturers of Muir-Hill dumpers and shovels, as their Representative for the North West of England and North Wales. Mr. Whitfield has been with the Company since early 1945, and has been in charge of their Spares Depot at Altrincham. During the war he was an Engineer in the Merchant Navy.

* * *

On Oct. 30 at the Kennington works of Parkinson & Cowan (Gas Meters), Ltd., a farewell supper was given by the staff in honour of Mr. A. T. WILMSHURST, who is retiring after 51 years' service. Mr. Wilmshurst entered the service of W. & B. Cowan at their old works in Smith Square, Westminster, in 1895, and has been Office Manager at Kennington. Gifts were made by the firm and staff, and tributes paid to the high example of character and devotion to duty which the recipient has set over so long a period. Concurrently with his long business service, Mr. Wilmshurst has, in his private capacity, been connected with the House of Commons' Church of St. Margarets, Westminster, for 60 years. He was chorister and afterwards sidesman, which office he still holds, having functioned on many historic occasions.

Nov. 21.—Midland Junior Gas Association: Visit to the Works of Wrights' Ropes, Ltd.

Nov. 26-27.—Institution of Gas Engineers: Autumn Research Meeting.

Nov. 30.—London and Southern District Junior Gas Association: Visit to Maidstone Gas Company. (To facilitate reduced railway fare arrangements, members intending to travel by train are asked to notify the Secretary as early as possible.)

Dec. 7.—Scottish Junior Gas Association: Joint Meeting of Eastern and Western Districts, Edinburgh.

Grangemouth Gas Supply

The Ministry of Fuel and Power has suggested that Grangemouth should receive from Falkirk Gas Department the extra gas it requires for future requirements. Mr. W. Ewing, Engineer and Manager at Falkirk, has reported that in view of the amount of gas required, it will be necessary to lay a 12 in. high pressure main from the Falkirk works to the Grangemouth works at a cost of approximately £10,000.

Mr. R. D. Keillor, Greenock, who was called in by Falkirk Gas Committee as a consultant, has submitted his report, and, as a result, the Committee has recommended that Grangemouth be supplied with gas for five years under a guarantee to accept a minimum of 223,000,000 cu.ft. in the five years ending December, 1951, at the rate of 3s. 4.39d. per 1,000 cu.ft. The minimum supply will be spread over the period, ranging from 5,000,000 cu.ft. in 1946-47 to 95,000,000 cu.ft. in 1950-51, or, alternatively, an average guaranteed minimum consumption of 44,600,000 cu.ft.

An alternative proposal is to offer Grangemouth a ten years' supply at 2s. 11.47d. per 1,000 cu.ft. provided they accept an additional guaranteed consumption ranging from 118,000,000 cu.ft. in 1951-52 to 220,000,000 cu.ft. in 1955-56, or a guaranteed annual minimum consumption of 107,300,000 cu.ft.

Falkirk Gas Committee has been advised that in view of the possibility of nationalization it might be desirable to offer terms which will take account of the capital costs incurred in giving Grangemouth this supply, apart from the actual cost of the gas.

The Gas Committee Convener and officials are to confer with representatives of Grangemouth Town Council as to terms and conditions.

Southern Association of Gas Engineers and Managers

THE Annual General Meeting of the Southern Association of Gas Engineers and Managers was held at Grosvenor House, Park Lane, on Oct. 29, under the Presidency of Mr. Frank Dawson (North Middlesex).

The **President** moved the adoption of the annual report which, he said, the Hon. Secretary had not had an opportunity of circulating to members prior to the meeting as the routine had been upset by the change of session from the calendar year to the twelve months ending June 30. The report, which had been approved by the Committee, outlined the year's activities which had been most successful under the immediate Past President, Mr. W. A. Howie, and recorded an increase in membership. Reference was also made to the revision of the rules and to the first post-war summer meeting held at Maidstone.

Mr. **H. J. Escreet** seconded, and the report was adopted.

Mr. **J. M. Webber,** Hon. Secretary and Treasurer, submitted the accounts, and mentioned that it had been decided to continue the increased contribution of 50 guineas to the Benevolent Fund of the Institution of Gas Engineers.

Mr. **L. P. Ingram** seconded the adoption of the accounts, which were duly approved.

Mr. **R. C. Taylor** moved, and Mr. **J. W. Townsend** seconded, the election of the following new members of the Association:

E. S. Buckley, Seaton.
W. J. J. Falkner, Romsey.
E. T. Goldthorpe, Bognor Regis.
A. F. Grant, Gas Light and Coke.
M. C. Greenwood, Beaminster.
D. V. O'Meara, Croydon.
P. Valon Bennett, Reigate.
J. D. C. Woodall, Maidstone.
W. Johnson, Wandsworth.
H. Wadsworth, Bath.
Associate:
Dr. G. E. Foxwell, Ashtead.

Revision of Rules

The **President** moved the adoption of the revised rules, and reviewed the considerable amount of work which had been done by the Committee and the Rules Sub-Committee in their preparation. Apart from the necessity of revising the rules to include the amendments that had been made from time to time since they were last printed, the main object had been to introduce a more representative election to the Committees and at the same time to keep the constitution as simple and straightforward as possible. The revisions had been approved by the Eastern District, and they also had the approval of the Western District Committee, although there had not been an opportunity of submitting the revised rules to a full meeting of the Western District.

Mr. **W. A. Howie,** Chairman of the Rules Sub-Committee, said the revisions were the result of several meetings, and he wished particularly to thank the members from the Western District who had travelled such long distances to help in the work.

Mr. **J. T. Haynes** (Bournemouth) seconded the adoption of the revised rules.

Mr. **E. L. Nicholas** (Guildford) observed that the old qualification for membership, based on the output of the undertaking, had been omitted from the new rules. He also moved as an amendment that the clause which barred for one year the re-election of a member of the Committee after serving three years should be amended so as to render him ineligible for re-election within three years.

Mr. **L. Trewby** seconded the amendment.

Colonel **H. C. Smith** opposed the amendment on the ground that, while a break in continuity of membership was desirable, there might be occasions when it would be an advantage to bring back an old Committee member after a break of one year.

The **President,** replying to Mr. Nicholas' first point, said the size of an undertaking was not necessarily a criterion of a man's qualifications, and the Committee had therefore substituted certain technical and professional qualifications. With regard to the amendment, the matter was open to the members, but he suggested that if a break of three years was insisted upon there might be difficulty in getting suitable members on the Committee.

The amendment was lost, and the revised rules were adopted.

Presentation to Mr. Howie

The **President** then presented Mr. Howie with a silver morning coffee service as a token of appreciation of his services as President during the past year. Mr. Howie, he said, had rendered valuable service to the Association, first as Hon. Secretary, a position he held for many years, during which he gave freely of his services for the benefit of the Association. Those services culminated in his election as President, and he had carried out the duties with dignity combined with his usual good humour. He was quick to take advantage of the cessation of hostilities during his year of office, and members would long remember the first post-war summer meeting at Maidstone. It was already known that he had retired from his professional career, and he took that opportunity of expressing on behalf of all the members the hope that he would have many years of good health in which to enjoy his retirement. If he might borrow a phrase from the late Prime Minister he would say that Mr. Howie was retiring in an odour, if not of sanctity, of good fellowship.

Mr **Howie,** in accepting the gift with warm thanks, recalled that owing to the difficulty of obtaining suitable gifts it had been their custom for the last few years to make what was called a token presentation of a silver salver to the outgoing President. His own salver had been used for that purpose so many times that when it became known to Mrs. Howie that the Association was graciously considering giving him a present she expressed an earnest desire that it should take a different form. The coffee set would give Mrs. Howie and himself the greatest pleasure and remind them both of his happy links with the Association, extending as they did from 1923. He had missed very few meetings during that period, and during his Secretaryship it had given him great pleasure to do what he could for the Association. Speaking now from experience as President he felt they owed a great debt of gratitude to the present Hon. Secretary for the tremendous amount of work he had done, and especially for his efforts in connexion with the revision of the rules.

A Noteworthy Address

The President then delivered his Presidential Address, which will be reported in a later issue of the "JOURNAL."

Mr. **N. Willsmer** (Gas Light and Coke Company), proposing a vote of thanks to the President for his Address, said that Mr. Dawson and himself were colleagues at the Fulham works a long time ago. In those days, when they were not worried by the shortages and difficulties to which the President had referred, it was obvious to his colleagues that Mr. Dawson would one day occupy a very important position in the Industry. Many of those colleagues were present that day, proud to see him occupying the Presidential chair, and they hoped he would enjoy a very happy year of office. He could assure him of the full support of the members.

He had rightly described as pertinent the question whether nationalization would enable them to produce a cheaper and better heat service, to offer better conditions of employment and to develop as a result of research and initiative the full potentials of coal processing in every respect. Unless the future rulers of the Industry made those essentials their objective there was no doubt that the Industry would soon come to an end. No progress would be made unless they kept them in mind. Would nationalization make any difference to their outlook in that respect? They had been their objective as long as he had been in the Industry, and whoever might rule them from the top they would still have to do the work, and it would be for them to keep those essentials in mind, and the harder they desired their attainment the better would be the chance of achieving them. In a subsequent paragraph the President suggested that it was impossible for the present management to continue its development of the Industry as if no threat of nationalization existed. On that point he disagreed with him. Looking round his works he was horrified at the tremendous amount of leeway they had to make up as the result of seven years of war; but they put nationalization in the background and resolved just to get on with the job and to make the works as efficient as possible so that when nationalization arrived they would not be ashamed to hand them over.

New Water Gas Plant

In the President's reference to the National Coal Board he would like to substitute the word "gas" for "coal," and say: "The Gas Board obviously cannot produce gas themselves; they are dependent on the goodwill and co-operation of gas engineers and managers and every man in the Industry." Later in his Address Mr. Dawson had referred to waste heat recovery and thermal insulation and drawn attention to the views which Dr. Pexton had expressed at the Industrial Waste Heat Conference. Members of the Association would be interested to know that a contract had already been let for a water gas plant of 18 million cu.ft. per day capacity, in which two of Dr. Pexton's proposals would be incorporated. The waste heat boilers would operate at 300 lb. pressure. In pass-out turbines electricity would be generated for the operation of the plant, and the pass-out steam would be used for the process. The plant would be fully self-contained and there would be a surplus of electricity from the plant for other purposes. It was hoped that the installation would be working in 1948, and he hoped to have the pleasure of showing members of the Association round.

He was glad to hear the President refer to improved working conditions; that was one of those matters to which they should give their immediate attention. There was a great deal to be done, and he believed many of his colleagues would agree that there were many jobs that they would like to do themselves. Dust removal was a problem that might be tackled, and had in fact already been tackled by a number of gas engineers with great satisfaction. He suggested that the question of expense did not arise, because it was a matter that must be dealt with if they were to do justice to their men in that respect. He agreed entirely with the President that short courses of training were beneficial. They had tried to provide them in a small way, and the staff had appreciated them. He would go further and say that there was no better way of learning the art of the management of men than by hard experience.

Mr. **W. K. Tate** (Portsmouth), seconding the vote of thanks, said the President was one of his oldest friends in the Gas Industry, and

he honoured and respected him for his work and in his home. They were pupils together at Fulham many years ago when Fulham was Fulham—a remark which he made without disrespect. They had in those days as their Station Engineer Mr. Solomon, a most respected colleague to all in the Gas Light and Coke Company, who, when engineers visited the works invariably prefaced his remarks by saying, with pride, "We at Fulham do so and so," and everybody listened, with bated breath or derision, as they felt inclined. The Association had been fortunate in its Presidents, and the Address to which they had listened was well up to the standard. It was not opportune or desirable to go into the details of the Address, of which there were many that might well form the subject of a whole meeting. There was, however, one point he had made which appealed to him and would particularly appeal to many who had been so badly affected, directly and indirectly, by the war. He referred to his remarks on mutual aid and the interchange of ideas on how to meet post-war problems. He was now connected with an undertaking where they had a most frightful problem. They were faced with a situation in which half the population which had been supplied with gas was going to be decanted into the surrounding area. Instead of having one large city they were going to have five satellite towns with 20,000-30,000 inhabitants each set down in the country. The problem might be easily resolved from the engineering point of view, but the financial problem was a very real one, and he felt that in some way the Gas Industry in the southern part of England would have to make a move in the matter. Whereas the planning authorities proposed to build the houses, somebody would have the job of carrying gas and other commodities to those areas.

The vote was carried with acclamation, and the President briefly replied.

The **Hon. Secretary** read a special appeal from Colonel C. M. Croft, Immediate Past President of the Institution of Gas Engineers, for increased support on behalf of the Benevolent Fund during Victory Year. The appeal emphasized that the needs of the recipients of assistance were not decreasing.

The **President** commended the appeal to the individual members.

Honorary Membership

The **President** drew attention to the fact that Mr. Robert W. C. Beynon, of Torquay, a very distinguished Past President of the Association, who was for many years Engineer and General Manager of the Torquay and Paignton Gas Company, had recently attained his 90th birthday, and he knew it would be the wish of the meeting to communicate with him and express good wishes for his continued good health. The Committee recommended that he be elected an Honorary Member of the Association, and he moved accordingly.

Mr. **C. F. Botley** seconded.

Mr. **L. Trewby**, who, in the earlier discussion on the rules, had suggested that some concession as regards subscription should be granted to those who had retired from active duties, supported, and suggested that all who attained the age of 90 should become Honorary Members.

The proposition was agreed to.

Prior to the meeting, there was a luncheon at which the toast of "The Southern Association of Gas Engineers and Managers" was proposed by Mr. **S. E. Whitehead**, a past President of the Institution of Gas Engineers. The toast was to have been proposed by Mr. G. C. Pearson, President of the Institution, who was unfortunately unable to be present. Mr. Whitehead referred to the good fellowship and solid work put in by the Association, and he included in his remarks the activities of the Eastern and Western Districts. As to the President, Mr. Dawson, he said that his work for the Industry and in particular for the Institution in regard to education spoke for itself and needed no commendation from him.

In reply, Mr. **Dawson** mentioned that the Association was established in 1875 and that in its 71st year it did, through its long tradition of good service, render all assistance possible to the Industry, and to the Government, in any changes that might be pending, and in this he was certain that the sense of leadership which had been developed in the Association would be used to advantage.

The toast of "The Visitors" was proposed by Mr. **H. J. Escreet** cleverly and wittily, the response being made by Sir **Guy Nott-Bower** in similar charming vein.

Co-Operative Effort at Watson House

A MEETING of the Managers of gas undertakings which have associated themselves on a subscription basis with the work of Watson House was held at Watson House on Oct. 23, under the chairmanship of Mr. A. E. Sylvester, Governor of the Gas Light and Coke Company.

Mr. SYLVESTER said that as a result of a meeting in December, 1944, he arrived at the broad conclusion that members wished the G.L.C. Centre to continue to function on the existing lines; and the general opinion then was that the Centre's activities should be confined to technical as against commercial matters.

To facilitate this the Company last year had made certain changes in its research organization when Dr. H. Hollings was appointed Controller of Research, Mr. W. Dieterichs was appointed Manager of Watson House, and Mr. G. C. Holliday Manager of the Centre.

During the war many of the research staff and particularly a very large proportion of those engaged at Watson House had made important contributions to the war effort in the investigation of technical problems, but from the beginning of this year the energies of the laboratories had been wholly directed towards the many pressing problems associated with post-war gas utilization.

New Coke Laboratory

Last year a new coke laboratory was opened at Watson House, and they had decided that this new laboratory should function as a part of Watson House, and Centre members now would get information on coke as well as gas appliances.

Substantial progress had been made in the resumption of the pre-war Centre activities and regular meetings of both the Domestic and Industrial Committees were being held. These had been well attended by representatives from undertakings.

A great number of new appliances had been received in the laboratories and reports on them were being issued as soon as tests and desirable modifications were completed. The reports in connexion with rehousing were being sent out as soon as available and were not held up for issue in the form of a quarterly bulletin. Preparations for the regular re-issue of the *Watson House Bulletin*, re-named the *G.L.C. Centre, Watson House Bulletin*, were complete.

Frequent visits and demonstrations of special plant for industrial processes had been arranged for firms operating in members' areas, and for architects and housing authorities to see new appliances and to discuss fuel problems in relation to housing.

Mr. Sylvester said that the Watson House staff, and particularly Mr. Holliday, whose work he could not praise too highly, had been working in very close contact with the Ministries of Works, Fuel, Supply, and Health, with the Building Research Station and with architects on technical problems associated with fuel equipment for the home—particularly the immediate problems arising out of the policy of building temporary and permanent prefabricated houses.

The policy of prefabrication and the tendency to adopt plumbing units and built-in apparatus had created new technical problems and called for the adoption in many cases of new installation technique, apart from the modification of appliances and the design of new appliances. A prototype of the Ministry of Works heat service unit was erected and to a large extent designed at Watson House. This close association with housing problems showed in which particular fields there was need for new types of appliances.

Information on housing matters was being made available to the Domestic Development Committee of the British Gas Council in view of its importance to the Industry generally.

Blanket Orders for Cookers

When the Ministry of Supply decided to issue blanket orders for cookers, it became evident that manufacturers without experience of the technical problems involved would enter this market and it was important to ensure that certain minimum standards were met and so by arrangement with the British Gas Council he had agreed that this work should be undertaken for the Ministries of Supply, and Fuel and Power at Watson House.

With regard to training, Mr. Sylvester said over 1,300 ex-service men had attended various courses between January, 1945, and September, 1946, and nearly 20% of the places available were reserved for the personnel of member undertakings other than the Gas Light and Coke Company.

At the last meeting brief reference had been made to the possibility of extending the service of the Centre to cover certain technical services in connexion with gas manufacture, and as a result of the reorganization and co-ordination of research activities the Fulham Research Laboratory was to become the main centre for chemical, as distinct from physical, research, irrespective of whether the chemical problems related to gas manufacture, gas utilization, or by-products.

Mr. Holliday, as Manager of the Centre, had had informal conversations with several members and they felt that they would like to have the opportunity of calling upon the Fulham laboratory staff for help in relation to specific problems of gas manufacture as they arose at any particular works. This was perfectly agreeable but the Gas Light and Coke Company would, of course, charge a special fee based upon the cost of any such special service. A general circulation of information on the problems peculiar to gas manufacture would not be done as with gas and coke utilization.

The number of undertakings which were at present members of the Centre was 135; 111 being full members, the remainder being group or foreign members. Including the Gas Light and Coke Company, this represented about 40% of the total gas made in England and Wales.

Subscriptions and Operations

During the war members' Domestic Centre subscriptions had been reduced from 1s. 6d. to 6d. per million cu.ft., and now that pre-war activities had been resumed, members had been asked to agree to a return to the pre-war figure as from July 1, 1946; and he thought it might place this question of cost in its right perspective if he gave some indication of the overall picture of research and development so far as his Company were concerned.

Mr. Sylvester gave the meeting some figures which showed that the Gas Light and Coke Company's total expenditure on research development was £84,000 per annum, of which £25,000 could be charged to the Centre. Contributions from members amounted to £12,000; income from other sources, such as work done for the Government and so on, brought in £3,000, and the balance of £10,000 remained a cost to the Company. This meant in effect that the Gas Light and Coke Company's contribution to the Centre worked out at 4s. 1d. per million. This of course was over and above the expenditure, namely, £59,000, which was not allocated to the Centre.

Under the heading of training alone, the total cost, without capital and overheads, was in the neighbourhood of £24,000 a year, of which £3,000 was recovered from other undertakings, leaving a balance of £21,000 to be borne by the Company.

No one could say what would happen to the technical organization of the Industry when nationalization became effective, but he felt sure that whatever the form of ownership the group of laboratories at Fulham and Watson House must continue to function and press ahead with the urgent technical problems in hand. If the Industry decided to set up similar laboratories on a regional scale the Gas Light and Coke Company would be ready to co-operate in any scheme for a reciprocal exchange of information and co-ordination of effort.

In the meantime the Company continued to accept applications for membership of the Domestic Centre from undertakings in other regions. Liverpool, Dudley, and Jersey had joined recently and he believed that several other undertakings had this question under consideration.

If a reasonable number of undertakings in another region wished to join as a group, the Gas Light and Coke Company were always ready to consider such an application on the basis that the subscription rate would be reduced and that one undertaking in that group would act as a liaison and as a channel of communication with the Centre.

In conclusion, Mr. Sylvester said that every effort was being made to render the service given by the Centre as useful as possible.

News in Brief

Stockton-on-Tees Gas Department is to supply gas cookers and water heaters on the hire purchase system, the payments to extend from three to five years.

Bridgnorth Town Council has endorsed an application by the Gas Committee for an increase in the price of gas from 1s. 3d. to 1s. 5d. per therm. The Chairman of the Committee told the Council that in the past they had been selling gas cheaper than they could produce it.

Bolton Gas Committee has decided that it cannot see its way to abolish gas meter rents. Such a step would cost £10,000 a year, and in view of post-war costs the Committee cannot afford it. The Department's estimated income and expenditure for the current year show an estimated loss of £4,421, with a debit balance of £37,536 carried forward.

Dividends are to be paid by the Plymouth and Stonehouse Gas Light and Coke Company on Jan. 1 for the half-year ended Sept. 30, at the rate of 5% per annum on the Ordinary stock, 7s. 6d. per share on the "Additional" shares, and 7s. per share on the New shares (1879), less tax. For transferees to receive this dividend transfers must be lodged not later than Dec. 9.

A Special Order has been made by the Ministry of Fuel and Power to enable St. Helens Corporation to supply gas in bulk to Golborne Gas Company. Laying of mains outside the Corporation area of supply will be necessary, and the Town Clerk has been instructed to apply for full grants of £10,584 on the scheme having regard to the inclusion of St. Helens and Golborne in the South Lancashire Industrial Development Area.

Complaint of lack of lighting in several streets was made at a meeting of the Burntisland Town Council. Residents had complained that there had been no lighting in certain streets since the outbreak of war. Mr. D. Marshall, Engineer and Manager of the Gas Department, explained that efforts were being made to have lamps in the area put into operation as soon as possible, but lack of labour and shortage in material were the difficulty.

Mr. W. Leonard, Joint Parliamentary Secretary to the Ministry of Supply, announced at Newcastle a Government drive to recruit 10,000 workers to make cookers and other necessary building materials to speed up the housing programme. The management and workers of an iron works he visited complained of the call up of apprentices Mr. Leonard said that the Government proposed to allow apprentices to complete their term—"where it can be proved that an establishment is capable of giving complete training."

Fifty Auction Sales are to be held by the Ministry of Supply's Directorate of Disposals (Regional) between now and March, 1947, to speed up the disposal of large stocks of miscellaneous surplus stores, including industrial and engineering equipment (less machine tools). Goods to be disposed of include hand trucks, petrol engines, industrial pressure gauges, gas heated furnaces, hand and petrol driven pumps, electric fans, wire rope, miscellaneous electric cable, ventilating plant, tools, boxes, steel containers, barrows, and a wide range of other stores. Between Nov. 1 and 15 sales will be held at Bristol; Bainton, near Stamford, Lincs; Llansamlet, Glam. Drybridge, Ayrshire; Wivenhoe, Essex; High Wycombe; and London.

Owing to the Shortage of Gas Mantles Sanquhar Town Council has had to curtail street lighting. At present only pilot lamps are lit and mantles for these had to be borrowed from a neighbouring burgh.

The Price of Gas at Grantham will be increased by 1½d. per therm as from the last meter readings and collections this year. This is the first increase made by the Grantham Gas Company since 1939. At Bo'ness the price has been increased by 2½d. per 1,000 cu. ft., making it 5s. 5d. per 1,000 cu. ft. for ordinary meter rate, and 5s. 11d. for slot meter rate.

There were 200 Entries for a fruit bottling competition held at the Denton Showrooms of the North Cheshire and District Gas Company. Mrs. M. J. Clephan, J.P. (Chairman of the Denton Council), distributed the prizes, Mrs. Tomlinson (late Senior Home Service Adviser of Dudley Gas Company), who did the judging; and Miss E. Sager (Home Service Adviser to the North Cheshire and District Gas Company) was responsible for organizing the competition.

Glasgow Gas Department is extending the capacity of the chemical plant at the Provan Works by the installation of new sulphate of ammonia and tar acid distillation units. The sulphate plant, which is going into operation immediately, has been installed by Simon Carves, Ltd., and will normally produce 30-45 tons per 24 hours. The continuous tar acid distillation plant, which is expected to be ready in six months, will have a capacity of 70,000 gal. per month.

The Erection of the £56,000 Extension to Dunfermline Corporation Gas-works is being held up by a shortage of steel. The Corporation protested to the Ministry of Supply, who replied that the type of steel work required to complete the work was of a high priority for export, and delivery to Dunfermline would not be made before the end of the year. As this threatens an interruption in gas supplies for periods in the winter appeals have been made to the Ministry of Fuel and Power who have approached the Ministry of Supply on the subject.

Newcastle-on-Tyne and Gateshead Gas Company has informed Hebburn Council of the terms for supplying gas to temporary houses. The appliances were provided by the Ministry of Works as part of the house structure and no separate charge for them fell upon the tenants. The tenants hired the meters from the Gas Company at a charge of 9d. a quarter and paid a deposit of £1 each, which was returned to them at the end of the tenancy, less any sum which might be due, together with simple 5% interest. A 10% discount was allowed for payment within 21 days.

An Ex-Service Radar Van, converted for peacetime use, is helping to speed up gas installation work in housing schemes in Hertfordshire. Converted in the office of Mr. J. L. Wilson, District Engineer of the Watford and St. Albans Gas Company, it is intended to make the work of installing gas equipment easier and faster. It is manned by two men, and is equipped with machine tools for pipe and tubing work for pipes ranging from ¼ in. to 2 in. internal diameter, an abrasive cut-off machine, a tube bender, screwing machine, and a bench drill and bench guider. An air compressor provides compressed air to test the soundness of tubing. Power is provided from an alternator on the front of the trailer.

Photograph by Elliot & Fry

Problems before the Coke Oven Industry

By G. A. PHILLIPSON

Presidential Address to the Coke Oven Managers' Association, Oct. 24.

THE high temperature carbonizing of coal in coke ovens is a comparatively new industry, and its development has been concentrated within the last 40 years. Compared with other and older industries progress has been remarkably rapid, and it can be claimed that as a coal processing operation it has reached a particularly high standard of efficiency.

This is the more remarkable when it is remembered that in early days, when the industry was completely new, no appropriate educational or training facilities were available and that the operators from abroad who were mainly associated with control of the earlier plants were not communicative about operating practice. A tribute can be paid to all those who, in spite of these handicaps, have nursed our industry through all its " teething " troubles, to reach a standard of efficiency not excelled in any other coal consuming operation. Not alone have they developed the technique of carbonizing to a high degree, but concurrently they have created facilities for education and training of our staffs, and the Association as a technical body takes its equal place with other technical associations.

Changed Values

A complete change of product values has taken place since the earliest days without any Statutory means—as in the case of our sister Gas Industry—of compensating for these changes, yet the industry has proved flexible and adaptable, and newer products have been developed to compensate for the decrease in value of the old, and the industry remains a virile and potential source of greater wealth. This position is the more commendable since the cost of our raw material—coal—has been enormously increased. As one of our achievements we claim that our industry has been largely instrumental in raising the value of small coal, from the low figure which existed in the early carbonizing days, to its present value, which is equal to that of large coal—a contribution which has not been adequately appreciated by the mining industry, and yet is one which must have greatly assisted in helping to maintain the standards of employment in that industry.

The question arises: Are we satisfied that everything has been done to develop our industry to its utmost capacity ? I am afraid the answer is in the negative. It should have been apparent, to all those interested in administrative control, that such a valuable industry should receive special encouragement to develop still further the potential wealth from coal through the carbonizing process. Particularly has the research field been neglected, and not until the last year or so has an attempt been made to establish a research organization, which has the merit of being specially suited to the industry. Even to-day this work cannot be described as fundamental research, but more as a statistical survey, which in addition to its practical value will assist in building up a framework for the more elaborate investigational work which is required. Our own Association has not been in a position to provide the finance to proceed in this matter, and we are appreciative of the initiative of the British Coking Industry Association in establishing the framework and raising the necessary funds to enable this preliminary work to be undertaken. If it is possible to continue this research organization, we will without doubt be able to investigate the technical approaches to establish our industry on the highest level.

Outstanding matters which are of immediate importance to the welfare of our industry and our country are, water gas synthesis; ethylene recovery; Thylox and similar systems of sulphur recovery; purification of, and recovery of phenols from, effluent liquor; prevention of emission of sulphurous fumes from direct cooling of gas—to mention only a few. All these processes are largely adopted on the Continent and in other coal processing countries. Mining as such is essentially a mechanical operation, whereas the processing of coal is a chemical operation. The training for the two industries takes widely different channels, which cannot help but cultivate a differing mental approach to this immediate industrial question. On the one hand there is essentially the manual-cum-mechanical approach, whereas, if the full benefit from coal processing is to be realized it will only be achieved by a mental approach which is the result of specialized chemical training. It is the policy of our Association to bring these facts to the notice of all concerned, and it is hoped in the planning under the nationalization programme that the Minister and his advisors will appreciate the necessity for the compete separation of these industries, and ensure that adequate opportunity is provided to encourage the technical development of coal processing, and recovering of further products.

We have a right to claim that these changes should be made The members of our Association can prove a high degree of achievement within the limits of their resources. The technique of coal processing has been brought up to a high standard, and yields and efficiencies have considerably improved. Oven designs in the twin flued oven, the circulation oven, the underjet oven, have all contributed to greater simplicity in operation. Oven structures have been greatly strengthened, contributing to long life. The technique of benzole recovery, fractionating, vacuum distillation, to name only a few, have all been due to the skill and enterprise of the plant constructors and plant operators. Even throughtout the war years, when our efforts were mainly directed to maintaining production at the highest level under very adverse conditions, our plants did not fail. These improvements, however, though important, are only improvements in technique. It is not advancement as such, and for this reason we cannot be satisfied, if the industry is to take its rightful place in the economic structure of our country, until there is a complete appreciation of the necessity for an adequate research organization covering all aspects of coal processing.

It is interesting to examine the relationship of our industry to that of kindred industries, and particularly the Gas Industry. It is obvious that the two industries could, and should, work side by side, in so far as the base products of coke, tar, and gas are concerned. The same carbonizing principles to all intents and purposes fill the needs of both industries, as any quality of product can be made in the system depending on plant design, quality of coal used, and rate of heating. One must therefore ask why it is that the two industries are divided, or rather, why cannot the two industries be as one, particularly since the coke oven industry is already contributing to the manufacture of domestic coke and also to the domestic gas requirements.

Planned Gas Grids

The Heyworth Report on the Gas Industry is the result of a serious and protracted investigation. This report suggests the country should be divided into areas, in which each area will become a co-ordinated unit supplying gas, &c., within that area. It is not entirely clear how far the process of elimination of the smaller uneconomical works—of which there are a large number—will proceed. In any case it is envisaged that central plants of larger capacity will be erected. The coking installations in operation at collieries, where the life of many batteries is nearing the end, and where the standard of efficiency, particularly in the release of surplus gas, is low, calls for a new building programme. Is this then not the time to implement the Fuel and

Power Advisory Council's recommendations for the provision of domestic gas supplies, and for a joint rebuilding programme to be planned with central carbonizing plants interlocked by planned gas grids? It will be an unwise policy to perpetuate the small, and by comparison, inefficient units which result in wastage of man power, wastage of plant, and variations in declared gas values, which are against more general standardization of gas consuming apparatus. This however, can only be the beginning of the story. There has been much talk regarding the potential development of the coal carbonizing industry, but this has not always been followed by practical proposals. With central carbonizing plants interconnected where possible by gas grids, an opportunity will be provided for increasing the value of coal by the manufacture in this country of further chemical products.

How then will these central carbonizing schemes operate? Take the present industrial load for gas and domestic coke. During the summer and winter periods there is a wide disparity in demand, yet the gas generating plant has to be designed for the maximum load. In consequence during the summer period it is estimated that there is approximately 30% of carbonizing capacity standing idle. This is a waste of productive capacity and a consequent loss to the country. With central carbonizing plants and planned gas grids, the capacity of the installations can be used all the year round. Even allowing for the domestic fuel requirements as envisaged in the Fuel and Power Advisory Council's Report, it should be found possible to provide the base products for one or more synthesis plants, and in this direction increased values can be realized from coal. During the summer months gas surplus to domestic requirements could be delivered to synthesis plant, and from this supply, augmented by coke, the synthesis process will be operated; concurrently, during this period surplus coke could be stored. When the winter demand reappears and the surplus gas is no longer available, then the synthesis plant will be turned over to operate on stock coke. Such a programme might take some years to bring to fruition, but benefits will be derived as each section of the development programme is completed.

Co-operation Essential

It will be evident that such a scheme could only be proceeded with in conjunction with the Gas Industry, and it would therefore appear to be an opportune moment to raise the question of closer collaboration between the two industries. Our retiring President referred to this matter in his Address last year, and we have from time to time heard these sentiments expressed by members from both sections. Since it would appear that the future of the two industries will become more and more interlocked, is the time not propitious for such an approach to be made? Not alone can the individuals in both industries benefit by such collaboration but it would open the door for a stronger and more authoritative organization. The coal processing and carbonizing industries should be placed under a National Coal Carbonizing Board, on lines more or less similar to the German Ruhr system, where the preparation of coal and all chemical processing is under the direction of expert technicians trained in the industry. By collaboration with the Gas Industry, we would represent coal processing to the extent of over 40 million tons per annum. Such an organization speaking with one voice could influence decisions, and ensure our industry being run on the most sensible and practical lines, and to the utmost benefit for the nation.

If such a scheme can be brought to fruition, then the way is made more easy for the education and training of the technical staff and personnel for the industry. At the moment efforts in this direction are not sufficiently co-ordinated, and a concentration on agreed courses could be made, particularly specializing in the training or physicists and organic chemists, which in my opinion are the two most important branches necessary to develop to the utmost the scientific treatment of coal. Research Fellowships for coal processing should also be established at suitable Universities.

Why Not Amalgamation?

We have just learned of the decision to set up Regional Joint Education Committees by the Ministry of Fuel and Power, the Institute of Fuel, and the Institution of Gas Engineers. The latter Institutions have already evolved educational systems for their members, and it is questionable if all these different approaches to an educational system which is basically dealing with a common problem will serve the best ends. The industry's requirements are becoming more and more standardized, and it should not be impossible to lay down a curriculum specially to cover the essential features of coal processing and utilization, &c., which would serve as a common basis for entry into all of these Institutions and Associations. Each individual Association or Institution could still preserve its own identity by any specialized training it thinks desirable.

What is there to prevent the Associations amalgamating? The interests are identical and industrial activities are to all intents and purposes the same, and since it would appear that both sections are to be absorbed in a general national project, it seems to be an obvious solution for the Associations to become one authoritative body acting for the industry.

It is in the light of present day political activities that I propound these questions. Nationalization may be the order of the future. Individually we may belong to any party—from extreme left to an old die-hard—but whatever our political views we are immediately concerned with an industry which means everything to us. We have been absorbed in bringing this industrial infant up to the state of adolescence, and it is our desire to see it is given adequate opportunity for its development in the future. If the Minister in his wisdom provides the opportunity for which we have so long desired, then our attention will be occupied in fulfilling the assurances we have given. The Minister should realize that by giving the industry freedom to expand, he will be creating conditions favourable to the general success of his schemes.

Safeguarding of Coal Resources

An important problem which should continue to receive priority thought by the technicians of the coal processing and consuming associations is the safeguarding of our coal resources, and the prevention of the waste of our most valuable coking qualities. While it is true to say that the industrial expansion of our country has been built up on coal, at the same time it may not have been good for the future of the industry that this coal has been so cheap for such a rich quality. These two factors have enabled our industrial machine to compete freely in the world's markets without recourse to elaborate coal processing, but because of its cheapness its use has been abused, and too little attention has been given to its application. In consequence research work in this country has not been maintained at standards comparable with those on the Continent. On the Continent—where there is little high rank coal—their industrial machine has had to be built up from inferior low rank qualities, and continual research work on a vast scale has been necessary to enable the material to be utilized economically in their industrial practice. As a result there have been built up large technical research organizations which are continually establishing new methods of upgrading their inferior coal, and new methods of processing to extract or produce commercially those products which are essential to their economic development. It is therefore vitally necessary that if we are to maintain our economic position and be able to continue to compete in the overseas markets, we should build up our research organizations on the highest level.

This fact is becoming the more apparent because of the increased price of coal and the shortage of supplies. The vigorous propaganda by the Ministry of Fuel and Power for the economic use of coal is an indication in this direction, and a nation wide examination of coal using methods is taking place, and already important economies have been established. This is of the utmost importance if we are to take advantage of our indigenous sources of power. It will also result in lowering manufacturing fuel costs by reason of reduced consumption.

While this policy is vital to the welfare of the country, it should be realized that it does not increase the value of coal, as such. It is in complete processing of coal and the economic use of the resulting products that its value will be increased, and so enable the financial and economic structure of the mining industry to be maintained.

Nationalization

I have been asked to express an opinion on the merits or demerits of nationalization. He would be a brave man who would dare to prophesy. As a Victorian I find it difficult to absorb these non-Victorian ideas, and I cannot think with all the faults that everything in the past has been wrong—as some would have us believe. This great nation could not have achieved its standing if the old system had evolved people without character. Can the new system maintain that character, without which we would lose our national position? It cannot be too strongly emphasized that our national life will be at stake, and while it may be permissible to experiment with industry, so long as such experiments are contained within our own domestic sphere, the reactions are within our own control and can be adjusted if proved unsatisfactory. On the other hand there may be a danger in experimenting with an industry which is open to international competition, as any unfavourable reactions in this case might permanently affect our international trade—and thus lower the standard of living for our people. I take some hope from the example of some of our great municipal undertakings. One can find very fine achievements among some of these, with services at least equal to those given under similar conditions by private enterprise. It appears to me there are two essentials in this great adventure if it is to succeed. The first is for the Government not to stifle operation and control by a mass of bureaucratic officials, but leave the operation and intelligent development to people who are trained and qualified in the art, and leave them with a sense of freedom, and allow those in charge to realize they are an essential part of the scheme. If the Minister and his advisers can ensure this, then the second condition—*viz.*, the co-operation of every individual—will be ensured. In such circumstances the experiment will at least be given the most favourable condition in which to prove itself. There is, however, one danger which is pertinent to out Association and which should be carefully avoided—*viz.*, the disruption of the carbonizing industry by dividing it into separate sections, which could only lead to a confusion of

interests. By placing the carbonizing industry under one control the greatest efficiency can be achieved, and the greatest benefit to all concerned.

C.O.M.A.

I do not think I should conclude this Address without some reference to the domestic affairs of our Association, particularly in the scientific and educational fields. For some time it has been felt that our representation on the numerous technical bodies with which we are associated has not been sufficiently representative of our members. As a result of a questionnaire to the industry a large number of members have volunteered for such duties, and it is the intention of your Council to use the willing members to a greatly increased degree for service on these Committees. This will bring an increasing number of members into direct contact with the technicians of other industries and Associations, and should help to spread the knowledge so gained over a wider field.

The British Coke Research Association is actively carrying out research work through Panels, working in collaboration with the Scottish, Northern, and Midland Coke Research bodies. Wartime conditions have considerably reacted against sustained investigational work and meetings. It is expected however that the results of these efforts will now begin to reach the members in increasing volume, which will prove of value to operating personnel. Proposals are now being considered for extending the work of this Research Association to include fundamental research, and to install a modern carbonizing plant capable of providing data on a working scale, which will enable the most valuable use of our raw material to be determined. Such a Research Station will cover the whole of the experimental field of practical carbonizing research, and it is hoped that this scheme will proceed regardless of any changes which might arise in ownership of our plants.

Interchange of Staff

An innovation of important interest to our personnel which has been introduced is the interchange of staff between plants, and this scheme will be in operation at an early date. While at the moment only a limited number of companies have agreed to this arrangement, it is confidently expected that other companies will join when the beneficial results of the experiment are realized. This effort if carried through in the right spirit should spread a feeling of friendliness throughout the whole of our members, and prove of immense good in furthering active co-operation throughout the industry.

In conclusion, I wish to appeal to all members of our Association to assist individually and collectively in upholding the traditions of our industry, and contribute to the maintenance and well-being of our Association. During the present critical stage of change, it is vitally necessary that we should speak as one body if there is to be any hope of realizing those conditions for which we are all striving, and only by the continued loyalty and support of all members can we hope to carry conviction to those quarters where our interests will be decided. During all these changes, when so many opposing interests are involved, we will at least be true to our principles if we preserve a spirit of loyalty and goodwill.

What is a Crisis?

Mr. Shinwell on Nationalization of Coke Ovens

The Annual Luncheon of the Coke Oven Managers' Association was held at the Connaught Rooms, London, on Oct. 24. The President (Mr. G. A. Phillipson) was in the Chair and the principal guest was the Rt. Hon. E. Shinwell, M.P. (Minister of Fuel and Power).

Mr. **Shinwell,** proposing the toast of "The Coke Oven Managers' Association," said a great deal was heard from time to time of an impending crisis. That was constantly dinned into his ears. Everybody knew there was going to be a serious crisis in the coal industry except the Minister of Fuel and Power! But he wanted to tell them that there was not going to be any crisis, if by crisis was meant that the industrial organization of this country was to be seriously dislocated and that hundreds of factories were to be closed down. No such dire event was going to happen.

He did not dispute the possibility—he would not say the probability—that shortages might be experienced in this connexion or that connexion. That appeared to be inevitable in present circumstances, but it was not certain and it would depend upon whether the trend of output which was in an upward direction was maintained. A good deal, too, would depend upon whether we could persuade the people of this country, whether they were engaged in industry or in the domestic field, that for the sake of the country in existing circumstances they must resort to voluntary economies in the use of fuel. He had expressed himself recently on the subject of man power in the mining industry, and his remarks had been subjected to considerable examination and analysis and, indeed, criticism. But he repeated that, provided we could proceed as rapidly as was practicable with the reorganization necessary in the coal industry—the provision of machinery, better haulage arrangements, &c.—we could face up with comparative calm to the declining man power position in the industry and we should be able to overtake all the arrears. He left it to the National Coal Board, presided over by Lord Hyndley, in whom he had the utmost confidence, to see that that reorganization was effected at the earliest possible opportunity.

Best Utilization of Coal

Continuing, he said he would pass from this to what was an equally important issue—*viz.*, the use to which coal should be put. If only scientific opinion on this matter of utilization had been acceptable to those in authority many years ago—not a few months ago, not since the legislation upon which nationalization was based—we might have been in a happier position to-day. It did not matter how much was produced, if the product was mis-used it was hardly worth producing at all. One of the principal defects of our national economy for a long period of time had been inefficiency in respect of research. Far more research should have been undertaken and, what was more important, the results of research should have been applied. In the laboratory sense, the utilization and carbonization of coal had been, he would not say fully exhausted, but fully understood. The problem in the laboratory sense had been solved. It was in the application of the knowledge in the possession of technicians that we were defective. We were now afforded the opportunity to utilize to the full the great ability of our technicians and research workers and to apply their knowledge—and, he emphasized, "that we intend to do."

He was not by any means disparaging the work that was done by the Mining Association in the region of research, but it was of the most recent character. When he became Secretary for Mines in 1924, little was heard of research connected with the Mining Association. If he might say so with great respect, the coal-owners of that period were more concerned with testing the issue with the mine workers as regards wages and conditions of labour. Research was of very little concern then. It came later, but it came a little too late, and it now had to be fully applied in all its aspects.

Eve of Nationalization

The coal industry was on the eve of nationalization. Shortly—he could not speak in terms of weeks or months, but shortly—there would come the vesting date and there would be transferred to the National Coal Board all the assets of the coal industry. Included in those assets would be many of the coke oven plants. They would be automatically transferred. There would be other assets which would be transferred as the result of arbitration. He hoped there would be no evidence of a stubborn attitude on the part of those who owned these coke ovens, for if full advantage was to be taken of the carbonization processes associated in particular with coke oven plants, it was far better that they should be closely integrated. To have the National Coal Board operating carbonizing processes which came under their control with other concerns operating their processes would, he thought, in the end lead to chaos. That was why it would be necessary, before long, to take over the Gas Industry. Yes, and they would also nationalize the electricity industry. It might be that before long they would take over the iron and steel industry.

All these problems could easily be resolved; coke oven plants, coal, independent iron and steel coke oven plants, all closely integrated. When that had been achieved, the question must be asked: "What is to be the form of organization?" That was very important. The production and distribution of coal was one thing, involving highly technical tasks, but carbonization and utilization were another. Of course, the question of ownership must be settled, as it would be. The question of administration must be settled, and that presented very little difficulty, but the utilization of the product whether in one form or another, and

the range of by-products derived from coal were, in essence, a technical problem, and it was for technicians to handle it. It was because he had conceived the notion, not a few months ago on the eve of introducing legislation in Parliament, but back in the years when he was associated with the Mines Department, that the need for utilizing the products of coal efficiently was so important in the interests of national economy that he devoted considerable attention to this subject, and now the opportunity was presented. He had appointed Sir Charles Ellis, a scientist of repute, to be Scientific Adviser to the National Coal Board, and he would expect Sir Charles Ellis as rapidly as possible to organize and co-ordinate research on the utilization of coal and to use technicians in an independent capacity in association with the Board so that coal would be used to the fullest possible advantage.

and apply research to the chemical side of coal processing. It was not generally appreciated that the processing of coal was a chemical industry, and that its control should be under the direction of men specially trained and qualified by practice. It was believed that with a true appreciation of the industry as a chemical industry—and with freedom to develop its potentialities—the members of the Association could make a valuable contribution to the solution of the coal problem. They were indebted to the British Coke Research Association for initiating a research system which was specially suited to the needs of the industry. Co-ordinating, as it did, the skilled practical mind with the scientist, it provided basically the ground on which to build an organization which could effectively deal with carbonizing problems.

The Annual Luncheon of the Coke Oven Managers' Association at the Connaught Rooms

Coal and Chemicals

He had been told that he had been unable to build up the export trade in coal. There were several answers, and one was this, that if he had to choose between sending coal abroad or ploughing it back into British industry, he preferred to plough it back into British industry. He said frankly that if it were a personal choice between exporting coal in its raw state to foreign countries, and turning it at home into valuable by-products and exporting them, he would prefer the latter. He did not suggest that this policy could be fully applied. It was necessary to export some coal in its raw state, for obvious reasons, but in so far as it was practicable—he would not even say economical—to turn our coal resources into valuable by-products and export them, he was all for it. In that adventure he would seek the aid of every responsible and intelligent technician in the coal carbonizing industry.

Alive to Need for Development

The **President**, responding to the toast, said it was very gratifying to learn, first hand, from the Minister himself, of his special interest in the carbonizing industry and also to know of the important place it occupied in the changes which the Minister was now directing. The coke oven industry had, to a large extent, been built up during the lifetime of the members of the Association, and they took pride in its present-day standing. At the same time, they were fully alive to the necessity for further development if full advantage of our indigenous sources of fuel was to be realized. It gave great satisfaction to have the Minister's assurance that full assistance would be provided to help them to realize their ambition. The most efficient use of our coal had not been practised in the past and it was only by scientific processing that its value would be increased. The Association represented 95% of the management and technical personnel of the coke oven industry, and it was the desire of every member that his services should be fully utilized for this important task, and so contribute to the greatest benefit of our country.

The design of coke ovens, and the knowledge of the mechanism of coke structure, had reached a high standard, and the application of research in this direction was well established. It was in the recovery and treatment of by-products of distillation that co-ordinated research had been lacking, and he commended to the Minister's attention the necessity for a concentrated effort to plan

Closer Liaison

Mr. **J. Bradwell** (Past-President) proposed the toast of "Our Guests"; and Lord **Hyndley,** responding, said he had followed the work of the Coke Oven Managers' Association since it was first formed and knew something of the strides it had made during the last 30 years. He himself had always been keenly interested in coke and by-products and he would like to give the assurance that he was certain the National Coal Board would treat coke as an industry. There was a lot to be done and he would not attempt to say much about the long term policy, but there would be a long term policy for coke and by-products. Even taking into account the advance which the industry had made, it would require thorough overhaul. He would like also to announce officially that Mr. Leslie O'Connor, who was Coke Director at the Ministry of Fuel, would join the National Coal Board. Mr. O'Connor would be in charge of the carbonizing section of the Board.

Mr. **G. C. Pearson** (President, Institution of Gas Engineers), whose name was also coupled with the Toast, spoke of the change that had taken place in the Gas Industry. Whereas coke used to be sold as an ordinary by-product in a dirty and unscreened condition without much regard to the purpose for which it was to be used, it was now screened and cleaned to suit the purpose for which it was required. Thus the Gas Industry had definitely become a two-fuel industry. In the same way the coke oven industry had become a two-fuel industry for instead of blowing gas into the air, as it used to, attention was now being paid to the production of good gas which was being sold in addition to coke. Coke ovens were a very good way of producing coal gas. As a matter of fact, it might be said that coke ovens produced in straight coal gas more therms than were obtained in any other system of carbonization, but the gas was on the rich side and required dilution for use as town gas. It seemed a shame to him that such rich gas should be used to heat the ovens, and he should have thought that producer gas would have been used throughout the coke oven industry. That would release a large quantity of good town gas for use throughout the country.

He had been interested in the discussions that had taken place as to a closer liaison between the Institution of Gas Engineers and the Coke Oven Managers' Association. Why should not a liaison of that kind take place?

Latest Figures—1945 Coke Oven Statistics

From the Ministry of Fuel and Power Statistical Digest

	Durham	Yorkshire	Derby and Notts	Lincs, Northants and Essex	Staffs	Lancs and Cumberland	Scotland	Wales	Total
Average monthly number of ovens in operation									
Compound ovens	227	183	79	260	65	62	149	223	1,248
Regenerative, other than compound	960	741	226	113	24	102	30	413	2,609
Waste heat	699	211	100	—	—	—	65	—	1,075
Beehive	119	32	—	—	—	—	60	22	233
Total	2,005	1,167	405	373	89	164	304	658	5,165
Census of ovens at Dec. 15, 1945 *Ovens in operation—*									
Compound ovens	229	183	79	247	65	62	149	223	1,237
Regenerative, other than compound	953	761	226	113	24	102	30	360	2,569
Waste heat	712	207	100	—	—	—	64	—	1,083
Beehive	108	32	—	—	—	—	60	18	218
Total	2,002	1,183	405	360	89	164	303	601	5,107
Ovens, available for heating up but not in operation—									
Compound ovens	—	—	—	16	—	—	4	11	31
Regenerative, other than compound	—	17	8	—	43	11	—	—	79
Waste heat	29	5	—	—	—	—	—	—	34
Beehive	83	42	—	—	—	—	—	—	125
Total	112	64	8	16	43	11	4	11	269
Ovens rebuilding—									
Compound ovens	14	—	—	—	—	—	—	—	14
Regenerative, other than compound	55	41	18	—	—	18	—	90	222
Waste heat	24	8	—	—	—	—	5	—	37
Beehive	2	3	—	—	—	—	—	—	5
Total	95	52	18	—	—	18	5	90	278
New ovens under construction—									
Compound ovens	12	22	9	—	14	—	—	11	68
Regenerative, other than compound	120	—	6	—	—	—	—	—	126
Waste heat	—	—	—	—	—	—	—	—	—
Beehive	—	—	—	—	—	—	—	—	—
Total	132	22	15	—	14	—	—	11	194

Coal Carbonized and Coke and Breeze Production at Coke Ovens

Thousand tons

	Durham	Yorkshire	Derby and Notts	Lincs, Northants and Essex	Staffs	Lancs and Cumberland	Scotland	Wales	Total
Coal carbonized, 1945									
At compound ovens	1,495	1,002	532	1,550	510	352	984	1,430	7,855
At regenerative, other than compound	3,490	3,394	988	683	46	610	97	703	10,011
At waste heat ovens	1,318	438	252	—	—	—	112	—	2,120
At beehive ovens	62	18	—	—	—	—	28	8	116
Total	6,365	4,852	1,772	2,233	556	962	1,221	2,141	20,102
Coal carbonized in 1944	6,274	4,811	1,822	2,343	542	922	1,229	2,192	20,135
Coal carbonized in 1938	6,457*		8,226		473	1,213	861	1,862	19,092
Coke and breeze production, 1945									
Coke	4,560	3,303	1,219	1,427	358	680	823	1,616	13,986
Breeze	169	189	76	116	31	40	54	67	742
Total	4,729	3,492	1,295	1,543	389	720	877	1,683	14,728
Total coke and breeze production in 1944	4,721	3,488	1,308	1,633	381	700	883	1,733	14,847
Total coke and breeze production in 1938	4,734*		5,753		350	911	638	1,469	13,855

* Includes small quantities for Northumberland and North Riding of Yorkshire.

THE COKE OVEN POSITION TO-DAY—*Continued from p. 772*

Disposal of Gas from Coke Ovens: 1945

Million cu.ft.

	Durham	Yorkshire	Derby and Notts	Lincs, Northants and Essex	Staffs	Lancs and Cumberland	Scotland	Wales	Total
Used on coke oven plant									
For heating ovens	38,669	26,499	10,116	6,770	2,759	5,196	6,450	6,740	**103,199**
For other purposes	1,597	2,177	190	180	18	699	1,099	711	**6,671**
Total	40,266	28,676	10,306	6,950	2,777	5,895	7,549	7,451	**109,870**
Used at collieries	1,900	2,275	1,599	—	—	13	—	24	**5,811**
Used at steelworks	11,191	2,126	772	13,663	450	2,583	1,780	11,482	**44,047**
Gas supplied to :—									
Gas undertakings	13,408	19,117	6,230	1,401	2,604	1,731	3,282	3,667	**51,400**
Electricity undertakings	1,893	34	—	—	—	—	—	—	**1,927**
Industrial consumers	374	780	7	451	—	303	—	—	**1,915**
Domestic consumers	—	—	12	—	—	—	—	27	**39**
Total	15,675	19,931	6,249	1,852	2,604	2,034	3,282	3,694	**55,321**
Total disposals	69,032	53,008	18,926	22,465	5,831	10,525	12,611	22,651	**215,049**
Gas bled or burned to waste	646	795	92	1,186	269	612	319	439	**4,358**
Total gas made	69,678	53,803	19,018	23,651	6,100	11,137	12,930	23,090	**219,407**

Hard Coke Disposals from Each Producing District by Main Classes of Consumers

Thousand tons

	Producing district								
	Durham	Yorkshire	Derby and Notts	Lincs, Northants and Essex	Staffs	Lancs and Cumberland	Scotland	Wales	Total
1940 :—									
Furnaces	2,669.7	2,273.3	378.1	1,733.9	244.1	579.3	714.2	1,305.4	9,898.0
Foundries	495.9	141.2	0.1	—	5.2	47.3	68.0	195.4	953.1
Other industry	669.1	624.7	281.3	6.3	51.9	131.5	68.9	187.5	2,021.2
Other inland	354.0	759.8	462.8	84.1	42.6	17.2	4.6	70.8	1,795.9
Shipments	511.9	55.2	3.1	—	0.3	1.5	20.6	80.7	673.3
Total	**4,700.6**	**3,854.2**	**1,125.4**	**1,824.3**	**344.1**	**776.8**	**876.3**	**1,839.8**	**15,341.5**
1941 :—									
Furnaces	2,575.5	2,072.2	330.3	1,733.2	231.6	494.3	636.9	1,210.8	9,284.8
Foundries	485.8	136.7	0.2	—	3.1	39.6	63.6	187.7	916.7
Other industry	811.0	630.6	317.5	9.9	62.9	138.0	69.7	262.7	2,302.3
Other inland	582.2	711.9	374.7	59.6	28.7	8.2	5.3	73.6	1,844.2
Shipments	337.5	0.5	—	—	—	0.4	6.0	55.6	400.0
Total	**4,729.0**	**3,551.9**	**1,022.7**	**1,802.7**	**326.3**	**680.5**	**781.5**	**1,790.4**	**14,748.0**
1942 :—									
Furnaces	2,797.9	2,174.2	325.2	1,782.5	212.9	519.0	629.9	1,238.7	9,680.3
Foundries	559.3	102.4	0.1	0.3	3.5	34.8	71.3	205.3	977.0
Other industry	873.8	665.6	322.8	8.7	81.2	138.4	96.2	272.9	2,459.6
Other inland	334.2	700.0	376.5	43.0	47.7	5.8	7.2	56.1	1,570.5
Shipments	133.2	—	—	—	—	0.9	38.4	28.2	200.7
Total	**4,698.4**	**3,642.2**	**1,024.6**	**1,834.5**	**345.3**	**698.9**	**843.0**	**1,801.2**	**14,188.1**
1943 :—									
Furnaces	2,625.9	1,851.0	306.0	1,754.9	190.0	471.9	555.6	1,204.6	8,959.9
Foundries	559.9	98.3	0.1	0.9	3.7	34.0	77.4	205.1	979.4
Other industry	976.2	679.1	331.3	14.3	90.7	132.9	162.5	279.1	2,666.1
Other inland	296.2	624.8	354.7	38.8	63.6	3.1	10.2	44.9	1,436.3
Shipments	148.7	30.6	3.7	—	—	5.1	38.0	21.5	247.6
Total	**4,606.9**	**3,283.8**	**995.8**	**1,808.9**	**348.0**	**647.0**	**843.7**	**1,755.2**	**14,289.3**
1944 :—									
Furnaces	2,522.6	1,765.7	484.7	1,363.6	200.9	460.9	511.6	1,112.1	8,422.0
Foundries	558.7	85.3	1.0	—	2.4	35.3	61.3	208.9	952.9
Other industry	1,040.1	828.1	402.1	73.0	98.0	133.7	201.5	294.9	3,071.4
Other inland	523.7	677.0	367.8	38.4	58.5	9.9	26.4	42.1	1,743.8
Shipments	45.2	6.2	0.6	—	—	0.9	61.5	3.8	118.2
Total	**4,690.3**	**3,362.2**	**1,256.2**	**1,475.0**	**359.8**	**640.7**	**862.3**	**1,661.8**	**14,308.3**
1945 :—									
Furnaces	2,511.8	1,733.2	485.1	1,328.7	217.0	488.9	526.0	1,111.7	8,402.4
Foundries	484.2	74.3	—	2.0	2.6	28.1	49.9	197.5	838.6
Other industry	1,037.5	874.5	397.9	54.6	89.7	137.8	170.3	245.2	3,007.5
Other inland	486.0	624.7	327.5	48.8	52.0	10.6	20.3	43.1	1,613.0
Shipments	26.0	0.4	—	—	—	0.4	61.4	12.5	100.7
Total	**4,545.5**	**3,307.1**	**1,210.5**	**1,434.1**	**361.3**	**665.8**	**827.9**	**1,610.0**	**13,962.2**

THE COKE OVEN POSITION TO-DAY—*Continued from p. 773*

Availability and Consumption of Coke (Excluding Breeze)

Million tons

	1938	1939	1940	1941	1942	1943	1944	1945
Production								
Gas-works	10.60	10.20	9.82	10.53	11.16	11.37	11.46	11.60
Coke ovens	12.83	14.03	15.35	14.55	14.90	14.45	14.08	13.99
Total	23.43	24.23	25.17	25.08	26.06	25.82	25.54	25.59
Changes in stocks at—								
Gas-works	Not available	Not available	− 0.17	+ 0.07	− 0.14	+ 0.22	− 0.39	− 0.01
Coke ovens			− 0.05	− 0.28	+ 0.02	+ .0.15	− 0.25	− 0.01
Tonnage available	23.43	24.23	25.39	25.29	26.18	25.45	26.18	25.61
Consumption								
Gas-works†	3.39	3.44	3.24	3.38	3.74	3.52	3.94	4.01
Blast furnaces	7.80*	8.95	9.90	9.28	9.68	8.96	8.42	8.40
Foundries	0.90*	0.92	0.95	0.92	0.98	0.98	0.95	0.84
Engineering‡	0.75*	0.75	0.75	1.12	1.31	1.34	1.28	1.04
Other industry‡	2.25*	2.25	2.25	2.40	2.43	2.63	2.96	2.52
Railways	0.10*	0.10	0.11	0.10	0.13	0.17	0.22	0.19
Non-industrial establishments‡	1.90*	1.90*	1.90*	2.00*	2.10	2.00	1.92	1.93
Domestic§	2.52*	2.51*	2.56	2.56	2.90	2.86	3.32	3.41
Miscellaneous (including Services)	1.70	1.02	2.86	2.89	2.55	2.67	3.36	3.03
Total (Great Britain)	21.31	21.84	24.52	24.65	25.82	25.13	26.37	25.37
Shipments abroad	2.12	2.39	0.87	0.44	0.26	0.32	0.14	0.13
Total consumption and shipments	23.43	24.23	25.39	25.09	26.08	25.45	26.51	25.50
Changes in distributed stocks	Not available	Not available	Not available	+ 0.20	+ 0.20	—	− 0.33	+ 0.11
Total	23.43	24.23	25.39	25.29	26.18	25.45	26.18	25.61

Note.—At the end of 1945 stocks were—

	Million tons
(i) at Gas-works	0.28
(ii) at Coke Ovens	0.08
(iii) Distributed (including Government dumps)	1.77
Total	2.13

* Estimated or provisional.

† Including coke used for the manufacture of water gas. In 1938, the quantity so used was 0.48 million tons; in 1944, 1.04 million tons; and in 1945, 1.10 million tons.

‡ The figures relate only to undertakings with an annual consumption of 100 tons or more of coal and/or coke.

§ Disposals of coke to domestic consumers including disposals to shops, offices and other establishments, partly or entirely non-residential, with an annual consumption of less than 100 tons of coal and/or coke.

Coke Production and Consumption by Regions: Year 1945

Thousand tons

	Northern	North Eastern	North Midland	North Western	Midland	Eastern	London	South Eastern	Southern	South Western	Wales (North & South)	Scotland	Total
Production													
Gas-works	362.2	783.3	632.5	1,813.3	1,323.7	480.2	2,840.1	541.2	638.5	763.7	316.7	1,101.4	**11,596.8**
Coke ovens	4,559.9	3,302.9	2,470.5	680.0	357.7	—	175.3	—	—	—	1,615.9	823.5	**13,985.7**
Total	4,922.1	4,086.2	3,103.0	2,493.3	1,681.4	480.2	3,015.4	541.2	638.5	763.7	1,932.6	1,924.9	**25,582.5**
Changes in stocks at													
Gas-works	+ 3.4	+ 3.4	+ 3.5	− 2.3	+ 7.6	+ 2.1	− 20.6	+ 0.5	+ 7.0	− 2.0	+ 3.5	− 17.9	**− 11.8**
Coke ovens	+ 5.7	+ 1.4	− 12.8	+ 1.5	− 3.0	—	− 1.0	—	—	—	+ 2.6	+ 0.2	**− 5.4**
Tonnage available	4,913.0	4,081.4	3,112.3	2,494.1	1,676.8	478.1	3,037.0	540.7	631.5	765.7	1,926.5	1,942.6	**25,599.7**
Less shipments abroad	32.1	1.5	—	0.4	—	—	—	—	—	—	17.5	75.1	**126.6**
Available for consumption	4,880.9	4,079.9	3,112.3	2,493.7	1,676.8	478.1	3,037.0	540.7	631.5	765.7	1,909.0	1,867.7	**25,473.1**
Consumption													
Gas-works	135.0	260.8	243.5	545.3	442.4	208.6	803.4	227.8	284.4	281.8	133.3	441.1	**4,007.4**
Blast furnaces	2,511.8	1,733.2	1,663.9	488.8	217.0	—	149.9	—	—	—	1,111.7	526.1	**8,402.4**
Foundries	484.2	74.2	2.1	28.1	2.6	—	—	—	—	—	197.5	49.9	**838.6**
Engineering	79.8	98.6	60.8	164.7	209.5	40.1	132.3	22.7	56.0	26.0	46.2	106.2	**1,042.9**
Other industry	593.1	166.2	144.4	584.8	106.2	110.7	271.5	66.7	40.4	44.8	165.0	223.9	**2,517.7**
Non-industrial establishments	155.4	152.9	128.1	282.7	138.5	97.5	541.3	89.1	92.4	60.4	35.7	154.2	**1,928.2**
Domestic	138.9	376.8	209.9	606.9	274.6	290.8	602.0	318.5	213.8	188.5	67.8	118.9	**3,407.4**
Miscellaneous (including Services and railways)*	395.9	313.7	391.5	304.1	347.2	188.6	264.9	254.7	252.2	95.2	184.8	228.6	**3,221.4**
Total (Great Britain)	4,494.1	3,176.4	2,844.2	3,005.4	1,728.0	936.3	2,765.3	979.5	939.2	696.7	1,942.0	1,848.9	**25,366.0**
Changes in distributed stocks	+ 13.9	+ 14.2	− 12.2	+ 28.4	+ 15.4	+ 18.7	+ 15.5	− 2.2	+ 19.8	+ 0.1	+ 11.3	− 15.8	**+ 107.1**
Total	4,508.0	3,190.6	2,832.0	3,033.8	1,753.4	955.0	2,780.8	977.3	959.0	696.8	1,953.3	1,833.1	**25,473.1**
Net movement [outward (+) or inward (−)]	**+ 372.9**	**+ 889.3**	**+ 280.3**	**− 540.1**	**− 76.6**	**− 476.9**	**+ 256.2**	**− 436.6**	**− 327.5**	**+ 68.9**	**− 44.3**	**+ 34.4**	—

Note.—See footnotes above.

* Estimated.

The Lockheed Principle*

Manufacture of Carburetted Water Gas

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THE operation of a C.W.G. plant by hydraulic power is not a new idea, and the many advantages of hydraulic operation over other forms of power transmission are well known. Its most attractive features include the unlimited mechanical advantage obtainable without complication of equipment, the simplicity of control, and the maximum pressure safeguard, which reduces to negligible proportions the risk of mechanical damage. Maintenance difficulties have, however, been encountered principally due to scoring of ram-rods by corrosion, but the change to oil in the hydraulic circuit has proved with experience to be the complete answer. Gas-making plant demands mechanical reliability with minimum attention over long periods of continuous operation, and the water gas plant requires in addition to this the ability, in an emergency, to shut itself down and to acquaint the attendant of the fact. The C.W.G. plant at Sydenham can lay claim to the accomplishment of both these requirements through the medium of hydraulic oil power operation throughout, for plant valve movements, interlocking, and emergency shut-down. Electric power is used to feed the coke from the hopper and to drive the operator and oil pump, but otherwise appears again only at the shut-down valve itself.

The control gear has been conveniently housed in two enclosed cabinets. The power cabinet contains the hydraulic oil pump, accumulators, and their control gear, and is sited against the wall on the operating floor, removed from all activities connected with the working of the plant, and the operator or controller, containing the hydraulic-oil control valves, operating camshaft, and the mechanism indicating plant-valve positions and safeguarding the plant from faulty operation, is located within easy reach of the instrument board and the controls regulating the supplies of air and steam to the plant.

The Hydraulic Equipment and Interlocks

A decision having been reached on the control system to be used, the next points to be considered are, first, the operating pressure and volume of oil required, and, secondly, arising from this, the type of pump to use. Oil pressure is an important question and reflects considerably upon the initial cost of the equipment. Pressures up to 3 tons per sq. in. can be obtained, and the most favourable pressure to adopt is ultimately arrived at by achieving a practical balance between the size of the cylinder, the stroke required, which governs the size of ram rod to be used, and the general proportions of the mechanism to be operated. For compactness, the higher pressures should be considered, but if long-stroke rams are required, which would demand a large diameter of ram rod from considerations of mechanical strength, then no purpose would be served in raising the oil pressure to a point where the size of cylinder becomes absurdly small.

The pressure also governs the type of pump used, with, once again, reflection upon cost, and, in this choice, reliability also must be considered. Three principal types of pump are employed, for low medium, and high pressures respectively. The low pressure pump, used in a limited sphere, is the centrifugal pump, whose characteristics are, a large volume of fluid handled at low pressure, together with free reversal of flow through the pump when the pump is stopped. This pump is used primarily as an electro-hydraulic jack, requiring full extension or full retraction of the ram upon the operation of an electric switch which starts or stops the motor, and the pump and motor are usually built co-axially with the ram cylinder in a single unit. The medium pressure pump is the most common unit operating to-day and is usually the well-known gear pump, which can develop in commercial designs large volumetric capacities at pressures up to 900 lb. per sq. in., or more, in a single stage. Special-purpose designs have been developed, utilizing several stages to increase the pressure still further. The high pressure pump is of the ram type, and is used for pressures of from 600 lb. per sq. in. to the maximum obtainable. In comparison with the gear pump, this unit is more complicated and for the same conditions tend to become more bulky, but its principle lends itself to more precise design and construction. Several designs are available, the cylinders being arranged in line, radially, or parallel with the driving shaft. In the first two types, the pistons are operated by ball or roller-race eccentrics with either spring-return or a locking ring retaining the pistons in contact with the eccentrics, and in the third type by a swash-plate through Michell thrust pads. Basically the three types are very similar, the rams and cylinders being finished to precision limits to such a degree of accuracy that no piston rings of any sort are required, and all working parts are either hardened or chromium-plated to obtain long working life.

A swash-plate-driven pump is on the market which will deliver a maximum quantity of oil up to a given pressure, and thereafter will automatically reduce the quantity delivered down to zero in stepless variations, while maintaining the pressure at the same constant figure, and further possibilities include hand-controlled variable pressure and volume, and an attachment which will automatically vary the pressure in several stages for varying periods of time in accordance with a pre-arranged cycle.

Safeguards

The operating pressure of the C.W.G. plant varies between 750 and 900 lb. per sq. in., and two safeguards are fitted, one against abnormally low pressure, operating at 675 lb. per sq. in., and the other against abnormally high pressure, operating at 1,000 lb. per sq. in. The pump adopted is a seven-cylinder radial plunger pump, running at 1,450 r.p.m. and delivering 340 cu. in. of oil per minute, being driven through V-belts by a 2 h.p. motor. It is interesting to note that the stroke of the pistons in this pump is only $\frac{1}{16}$ in. Since pressure oil is required by the plant continuously, and at varying rates, according to the number and sizes of cylinders operated at any time, the pump is arranged to operate in conjunction with two accumulators. The second accumulator has been fitted to provide a reserve supply of pressure oil, which is made use of only in the event of a failure of some kind on the plant, but the pump maintains the supply of oil therein continuously. The size of the accumulators has been fixed at a figure such that sufficient oil is contained in the two to operate all the plant valves once, simultaneously, when required, and the pump capacity is arranged so that the pump is running under pressure for about 50% of the operating time.

The power cabinet installation incorporates the pump, accumulator and the control gear. The accumulators are air-loaded, and are fitted with free pistons. Oil is contained below the pistons and air charged into the space above the pistons by hand, as required, from a reserve supply in a high pressure storage bottle, through a non-return valve and regulating needle valves, the accumulator pressure being indicated on a pressure gauge. The storage bottle is normally isolated from the accumulators, but the accumulators have been designed of sufficient strength to safely withstand the air-bottle pressure, to ensure safety in the event of a mistake on the part of the attendant. The working accumulator is provided with a second air-bottle functioning as an integral part of the accumulator. The air in the accumulators is not used in any way, and only very small make-up is required at long intervals to replenish minor leaks in the air connexions. The working accumulator and its air-bottle maintain the oil pressure in the hydraulic circuit, the pump being called upon to replenish the oil supply as the piston in the accumulator falls to a given level. The movement of the piston varies the volume occupied by the air in the air-bottle and upper portion of the accumulator, and as the piston falls the air pressure is reduced, due to the increased volume available for the air. The change of air pressure causes a similar change of oil pressure in the oil supply lines, and the total variation permitted is controlled by the accumulator cut-out valve, referred to later, which operates to bring the oil pump into action or to by-pass it to the tank when the prescribed pressure limits are reached. The normal pressure variation permitted is between 750 and 900 lb. per sq. in.

A Word of Warning

One word of warning must be sounded on the question of the reserve high pressure air storage bottle. Particular care must be exercised to ensure that under no circumstances may an oxygen bottle be coupled to the line. Oxygen reacts with oil with explosive violence. At Sydenham, a further precaution has been taken by using inert nitrogen to charge the accumulators.

* From a Paper entitled the "Application of the Lockheed Principle to the Automatic Operation of a C.W.G. Plant" presented to the Southern Association of Gas Engineers and Managers (Eastern District), Oct. 22.

Tracing the oil flow through the cabinet, oil travels from the 10 gall. oil storage tank, through a fabric filter of very fine mesh, to the oil pump suction, where a vacuum gauge registers the condition of the filter. The pump conveys the oil under pressure through a coarse metallic filter and pressure relief valve to the combined non-return and cushion valve, a connexion in this valve transmitting pressure to the accumulator cut-out valve, and then to the two accumulators, feeding the working accumulator directly and the standby accumulator through a non-return valve. In the event of a failure of oil pressure in the pump delivery line the non-return valve prevents loss of pressure in the standby accumulator. In the line from the cushion valve to the accumulators are fitted connexions, coupled to a pressure switch cylinder which safeguards the plant against abnormally low oil pressure, and a pressure gauge.

The coarse metallic filter protects the finely-finished valves in the hydraulic circuit from damage in the event of a failure in the pump, which could lead to the pumping of metallic particles through the oil circuit.

The pressure relief valve safeguards the equipment against abnormal rise in pressure, and blows at 1,000 lb. per sq. in., discharging the oil to the storage tank.

The non-return and cushion valve carried out two functions. First, it prevents reversal of flow from the accumulators back to the pump secondly, it modulates the action of the accumulator cut-out valve. and reduces shock vibrations which would otherwise be present in the oil lines as a result of the rapid action of this valve.

Accumulator Cut-Out Valve

The accumulator cut-out valve bears rather a misleading name, since its action is to by-pass the pump to tank when the accumulators are filled with oil and at their maximum pressure, and to bring the pump into operation when the volume of oil in the accumulators is lowered and their pressure falls to a minimum. The valve itself is a toggle-operated, snap-over, valve controlled by the movement of a piston, on which accumulator oil pressure plus a nest of " cut-out " springs is opposed to a second nest of " cut-in " springs, adjustment of the appropriate spring pressure resulting in an alteration of the pressures at which the valve is moved. The valve directs oil from the pump to the accumulators or to the tank, according to the valve position, and is controlled from the working accumulator only. As the oil flowing into the accumulator raises the piston, the air pressure, and consequently the oil pressure also, rises, and the increased oil pressure on the cut-out valve piston, with the assistance of the " cut-out " springs, moves the piston past the " snap-over " position of the valve, which then re-directs the oil to the tank. As consumption of oil takes place from the accumulator, the piston falls, and the oil pressure falls also, until the reverse action of the valve once again directs oil into the accumulators. The sudden action of the change-over valve removes load very suddenly from the pump, with the possibility of hammer occurring in the pipe-lines. The cushion valve modifies the effect of this rapid action by providing a lightly spring-loaded needle valve, which is normally closed against flow of oil from the pump pressure line to the lower connexion between the cushion valve and the cut-out valve. The valve is held in the closed position by the pressure in this lower connexion, which is passed into an annulus below the valve through a non-return valve. The operation of the cut-out valve connects this pipe to drain, and slow leak-by from the annulus beneath the needle valve into the line gradually allows the needle valve to open under the influence of the pump pressure, to by-pass the pump through the line to the drain line from the cut-out valve.

Pressure Oil Supply Line

From the working accumulator, the pressure oil supply line is taken to the plant valves and the operator, and the connexion also runs to the electric solenoid shut-down valve in the power cabinet, to which a separate pressure oil supply pipe is connected from the standby accumulator, together with a drain line to the oil storage tank and a shut-down line to the operator. The shut-down valve is spring loaded, and is held in the normal position, against spring pressure by the solenoid. In the normal position, the valve directs pressure oil from the standby accumulator into the shut-down line, and the supply of pressure oil from the working accumulator is shut off, the drain line not being in use. A fault occurring on the plant breaks the solenoid electric circuit, and the valve moves under the action of its spring to the " tripped " position. In the " tripped " position, the valve connects the standby accumulator to the pressure line to the plant valves and operator, supplementing the supply in the working accumulator, and the shut-down line to the drain line back to the tank, lowering the pressure in this line. The effect of reduction in pressure in the shut-down line is to operate all the hydraulic control valves in the operator in such a manner as to move the plant valves to the " shut-down " position by mechanism to be described at a later stage. Should the pressure in the working accumulator be low, the oil stored under pressure in the standby accumulator carries out the operation alone, until pressures in the two accumulators become equalized, when they complete the action together, the non-return valve in the working accumulator oil line preventing back-flow.

A plant shut-down may be initiated by four conditions :—

(1) Failure of electric power supply or stoppage of the operator motor.

(2) A slow, or incomplete plant valve movement, an inadmissible setting of a cam in the operator, or an attempt to operate a valve by hand from the operator hand levers, at an inadmissible point in the cycle, will all open a switch in the operator.

(3) Fall of oil pressure in the working accumulator below 675 lb. per sq. in. allows a spring-loaded long-travelplunger in the pressure switch cylinder to retract under the influence of the spring to a sufficient degree to open a second switch.

(4) Fall of oil level in the storage tank below a controllable minimum permits the opening of a float-controlled switch.

These three switches cut off power to the solenoid valve, and before the plant can be put to work again the solenoid shut-down valve must be reset by hand.

Testing the Plant

For convenience in testing the plant, a three-position rotary switch is included in the control panel, which permits isolation of these electric switches. Position 1 renders all switches operative and enables the plant to run automatically with fully automatic shut-down in the event of a fault. Position 2 enables the plant to be operated by hand without the operator motor running and with automatic shut-down still operative, and isolates the operator motor from the shut-down circuit. Position 3 is the " test " position, in which all valves are held in the " shut-down " position, and the operator cam-shaft can be rotated for cam adjustments without being stopped when it reaches the " standby " or " shut-down " position.

The arrangement of the units in the power cabinet is neat and convenient for servicing. The air-bottles and accumulators are arranged on one side of a central bulkhead, with a large access door, and the remainder of the equipment in the second compartment on the other side of the bulkhead with a further access door. The tank is mounted on the side panel, with the pump and motor bolted down centrally on the floor, and the various control valves attached to the bulkhead at the rear.

From the power cabinet are run to the operator the following services:—

(1) Pressure oil from the working accumulator.

(2) Main drain from the operator to the power cabinet oil tank.

(3) Special shut-down oil pressure line from the solenoid shut-down valve.

(4) The electric conduit carrying the necessary connexions for the pump motor and solenoid valve.

Control of Complete Cycle

The operator controls the working of the complete cycle of plant valve operations through the medium of a camshaft driven through reduction gears by a ¾ h.p. D.C. motor fitted with a Creed governor to maintain constant speed. The final pair of gears driving the cam-shaft are arranged on the end of the controller in a readily-detachable gear case, and can be changed for alternative pairs of gears to effect changes in cycle time when required. The cycle time operated at Sydenham up to the time of writing has remained unchanged at 3 mins. although trial runs at other cycle times have been discussed. The Creed governor briefly consists of an adjustable centrifugal switch which operates to switch into, or out of, the motor field circuit a fixed resistance, according to the speed variation. The speed thus continually fluctuates by very small increments above and below the mean speed, which can be varied over a small range by variation of the setting of the centrifugal switch.

The camshaft is carried in three bearings in the top of the operator case, immediately beneath a hinged cover, through which access is obtained to the eight pairs of adjustable cams initiating the movements of the eight hydraulic selector or control valves. Ten rams are fitted on the plant, of which two, the secondary and tertiary air rams, are operated simultaneously by a single control valve, while the boiler stack valve and superheater stack valve rams are provided with stop valves in all their oil lines so that one only of these valves is moved by the operator, the other remaining closed.

The eight oil control valves are mounted on the back of the operator behind and below the camshaft, on two common oil manifolds, to which are connected the pressure oil supply and the main drain, running from the power cabinet. A further supply pipe from each valve runs vertically downwards through the platform and then to the piston head of its respective ram, through which the flow of oil, governed by the control valve, strokes the ram to the required position. The constant pressure oil supply, running to the rod side of the rams, is taken from the pressure oil line at suitable points beneath the platform between the operator and power cabinet. The special shut-down oil line from the power cabinet is connected in the operator to the head of a special shut-down ram, a further connexion from the pressure oil supply line being made to the rod side of this ram also.

(To be continued.)

Impedance of Meter Valves*

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Concluded from p. 732)

New meters generally stand up to guarantee of five years, but a high proportion give trouble before ten years. The majority give over ten years service before requiring repair.

After a meter has been repaired it has a good chance of giving trouble-free service for a further five years, but little chance of surviving ten years.

The indications are that the average life of a meter with one repair and overhaul is approximately 25 years. For a precision instrument working under decidedly imperfect conditions the general performance may be considered surprisingly good.

The analysis of faults however suggests that probably 50% of the faults are due to valve trouble which, if eliminated or only partially so, would result in considerable benefit.

Of Bradford's 85,000 meters it is suggested that over 30,000 have had to be brought in because of faulty valve working, in nine years.

SECTION VI

CONCLUSIONS

By reason of the larger valves and smaller diaphragms of the H.C. meter as compared with the old type "lights" meter, the margin of power to operate the meter is correspondingly less and any resistance, as for instance, sticky valves, is more likely to cause faulty operation or even complete stoppage.

Stickiness and drag between the sliding faces of the valve may result in:

Straining and possible distortion of the motions.
Faulty registration.
High absorption of pressure.
Oscillation.
Noisy operation.
Stopping and self-starting, extinguishing lights and then passing gas which may issue unburnt, as experienced in one or two instances in Bradford.

Valve trouble may be the cause of 50% meter faults, elimination or partial reduction of which would result in considerable benefit.

Established and suspected causes of sticking valves may be enumerated as follows:

(1) Nitrogenous gum carried by the gas and deposited by contact and impingement on the valve sliding faces.
(2) Corrosion of the valve metal at the faces by interation of H_2S with the antimony and tin of the valve metal, pitting the metal and producing imperfect faces, and also producing elemental sulphides, which become a sticky paste with slight moisture oil, or condensed hydrocarbons. The H_2S may be either the result of imperfect extraction at the gas-works, or may be the result of the reaction of organic sulphur compounds with any ammonia which may be present.
(3) A gummy substance carried forward by the gas from the oiled diaphragm leathers and deposited on the valve faces. This is not very likely.
(4) Small particles of solid foreign matter such as rust, &c., from the mains, service, or meter parts, carried by the gas.
(5) Introduction of oil as a lubricant with subsequent neglect. Deficient lubrication whereby a thin broken film of oil has thickened with any deposit present and become sticky, or simply because the film of oil has broken down.
(6) Effects of temperature or temperature fluctuations.
(7) Naphthalene deposits in meter (not troublesome in Bradford).
(8) A combination of any or all of the above.
(9) Other deposits from unknown sources or other unknown causes.

To improve conditions at the meter, it is suggested that the gas production engineer should reduce nitrogenous gum passing out with the gas, to as low a concentration as possible and to this end it is suggested that continuous gum tests be instituted where this is not already being done.

To prevent sulphiding of valve metals, it may be advisable to reduce H_2S content to less than is now required by the prescribed tests. To reduce possibility of H_2S formation as the result of reaction between ammonia and carbon disulphide, gas passing on to the district should be ammonia free, with a low organic sulphur content.

Damage to valves by small particles of solid foreign matter such as rust, &c., may possibly to some extent be overcome by the introduction of a filter or trap at the meter inlet. Such a trap would of necessity be efficient while offering little resistance to gas flow. If such a trap could operate on the impingement principle it may also hold some nitrogenous gum should any be present.

To resort to oiling as a means of alleviating sticking valves has initial advantages, but once started it should be continued, and it is doubtful whether as a long term policy the treatment is wholly advantageous. There is no doubt that if sticky deposit was non-existent, oiling would be decidedly unnecessary and even disadvantageous.

With regard to valve metal, there appears to be a case for research. An ideal metal, alloy, or other substance would be inert to all corrosive constituents in the gas and would be sufficiently hard to resist erosion and abrasion by solid foreign matter carried by the gas, and at the same time have as low a coefficient of friction as the soft white metal alloys when clean. It is quite possible that these points are from time to time receiving consideration, and it is probable that better conditions for meter operation will, as a result, ensue.

It appears obvious, however, that prevailing conditions and combinations of circumstances will never present ideal conditions for the present design of meter, and if faultless or nearly faultless working is to be obtained a new design of meter will have to be produced, the design being such that the gas itself is not in contact with the mechanism, and whether such a condition could be obtained by a variation of the present type of meter or whether such a condition could only be satisfied by a type of inferential meter which would meter satisfactorily low consumptions, it is difficult to say. The now almost universally adopted dry case meter has the same principle of working and is little different in design or at least fundamentally the same as that introduced a hundred years ago.

APPENDIX

THE BRADFORD METER

Disadvantages of Orthodox Valves

The usual dry type meter has two reciprocating slide valves synchronized to open and close ports in sequence and make the continuous operation of the meter possible.

It appeared in the light of our experiences that disadvantages attended this design. These are:

(1) The valve faces are alternately covered and uncovered with the motion of the valve. When uncovered they are exposed to intimate contact with flowing gas and free to trap and collect impurities and foreign matter, and become subject to corrosive influences should there be any.
(2) Each valve makes one forward and one reverse motion each cycle, each valve therefore ceases motion twice each cycle. To start sliding motion between two surfaces always requires more effort than to maintain motion when once started. With clean and perfect valve faces, the biggest effort required at the valve is at the commencement of each stroke, i.e., at the reverse of motion and when starting from rest.
If foreign matter, gum or other resistance to motion is present then the effort to start each stroke is correspondingly greater.
(3) Any foreign matter between the surfaces is first pushed one way and then the other with the reciprocating motion of the sliding valve. This causes accumulation of foreign matter and sticky deposit in patches, producing jumping and lifting of the valve off its seat, and is a cause of slow registration. Another effect of this characteristic forward and backward motion is to slide over any film which may be present between the faces, causing the film to form grain in the direction of motion. With the reversal of direction the valve is working against the grain so formed. This will also cause jumping, lifting or drag, by creating a restriction manufactured by the previous stroke.

Bearing in mind our experiences, and considering the disadvantages of the orthodox valves, we thought that an improvement might be effected by the use of a valve so designed as to never uncover its main sliding faces to the flow and impingement of gas, and so remove chances of harmful influences finding a way to the faces, and again so designed as to be uni-directional and eliminate reciprocation.

To achieve these aims it obviously meant continuous faces and therefore a circular valve with concentric rotary motion over a circular valve grid.

Such a valve was designed and made. It is described and illustrated in this appendix. Also given are the results of some tests. No claims

* From a Paper to the Manchester District Association of Gas Engineers, Autumn Meeting, Oct. 18.

are made for this rotary valve meter, it certainly has disadvantages, chiefly of manufacture, and it may be more costly, whether these disadvantages can be overcome, or whether advantages outweight disadvantages and make its use worth while remains to be seen. The valve is simply put forward as an attempt to effect an improvement, and as a matter of interest.

A sketch of a meter fitted with the rotary valve is shown in Fig. 1. The valve is driven directly from the flag rods through motion links and crank. The motion is rotary and continuous in one direction Ports are arranged for the admission and exhaust of gas, and so positioned to open and close in proper sequence and allow of proper functioning of the meter and the free flow of gas. The valve grid has three circumferential faces, between which are the inlet and outlet ports. The valve plate rotates on these faces, being itself continuously faced. Consequent on the design, the circumferential bearing faces of the valve and cover are in full contact at all times and are never uncovered or exposed to the gas flow at any time. The cross radial faces are of necessity exposed to the gas as they become uncovered, but this is considered of not very great importance since the cross faces are very short in length in the direction of motion, and from observation are maintained comparatively clean.

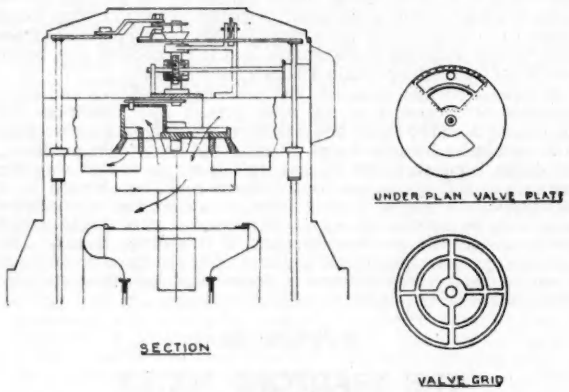

Fig. 8

Two meters were made with rotary valves, one a 100 cu.ft. smal high capacity and the other a 100 cu.ft. high capacity. Tests showed that registration was accurate throughout the range to twice the badged capacity, but pressure absorption was not so satisfactory, being higher than would be obtained with a new meter of the orthodox slide valve type. It was recognized that any new meter must, first of all, at least equal the performance of the standard reciprocating valve meter in accuracy, pressure absorption, minimum oscillation and adaptability for various sizes of meters.

The tests showed that at badged capacities the S.H.C. meter absorbed 0.345 in. W.G. and the H.C. meter 0.272 in. W.G. with inlet gas pressure 2 in. W.G. A further examination revealed that most of the pressure absorption was due to resistance of ports and gasways and practically nil to motional resistance of the valve. It appeared necessary that gasways and valve ports be enlarged and that various small modifications in design be made.

Accordingly a new valve was made and fitted to a 200 cu.ft. H.C. meter. A bench test gave the following result:

Inlet pressure	Output per hour cu.ft.	Air tests				Test holder registration cu.ft.
		Absorption				
		Max.	Min.	Osc.	Mean	
Tested at 20 tenths water guage	5	.240	.123	.127	.181	2.02
	10	.230	.128	.102	.179	2.00
	20	.248	.128	.120	.188	1.99
	30	.270	.162	.108	.216	1.99
	40	.268	.108	.070	.233	1.99
	50	.280	.222	.058	.251	1.99
	60	.290	.238	.052	.264	1.98
	70	.256	.185	.071	.220	1.99
	80	.310	.260	.050	.285	1.98
	100	.340	.285	.055	.312	1.98
	120	.333	.282	.051	.307	1.98
	200	.405	.316	.089	.360	1.98
	250	.595	.575	.020	.585	2.03
	400	1.145	1.125	.020	1.185	2.03
	450	1.117	1.116	.001	1.116	2.03
	5	.255	.148	.107	.206	2.01
	550	Maximum flow				2.07

Test No. ...

Size ... ... 200 ft. S.H.C.
Type ... Ordinary—rotary
Capacity per hour ... 200 cu.ft.
Test circle ... 2.0 cu.ft.
Meter No. ... 1662771

While this bench test showed the results satisfactory in many respects, pressure absorption was still too high. An examination revealed this was largely due to a defect in construction whereby downward thrust of the valve driving spindle caused by the index worm drive resulted in unnecssary binding of a collar on the bearing bracket.

These defects were remedied and the meter subjected to stringent tests. The object of the tests was to ascertain the performance of the experimental rotary valve type meter after subjecting it to severe working conditions over a period of time.

The manner of testing was to connect the rotary valve meter in parallel with a similar size standard type meter fitted with the usual slide type of valve, and subject both meters to identical conditions of working, comparing their performance and condition before, during, and after the test run.

The meters under consideration were:

Rotary valve type meter ... ... No. 1662771. 200 cu. ft. per hour H.C.
Standard type meter ... ... No. 1653170. 200 „ „

Both meters were manufactured by the same maker, and had not previously been used. The valves of both meters were dry, *i.e.*, lubricant was not used nor introduced.

The meters were installed alongside each other on the test bench with connections in parallel, with provisions for introducing foreign matter to the gas stream in the form of finely divided iron rust, and also means for introducing controlled quantites of impurified gas containing approximately 550 grains H_2S per 100 cu.ft. of gas, into both gas streams. (See sketch of arrangement.)

The reason for this drastic treatment was to produce severe conditions of working for both meters, observing and comparing the effects. Stopped meters, noisy meters and meters registering excessively slow, when brought in off the district have shown on examination black sticky deposits between the valve faces, and a careful investigation showed that the troublesome deposit causing drag, jumping and even stoppage, consisted to a large extent of black elemental sulphides of tin and antimony, made greasy with oil and slight condensation, together with other foreign matter in the form of iron rust, small quantities of gum, &c. The desire was to reproduce these conditions in an exaggerated form on the test bench.

Before the meters were installed for the test run, pressure absorption and registration performances were obtained:

The meters were erected in parallel on the test bench in the manner shown in sketch, Fig. 9.

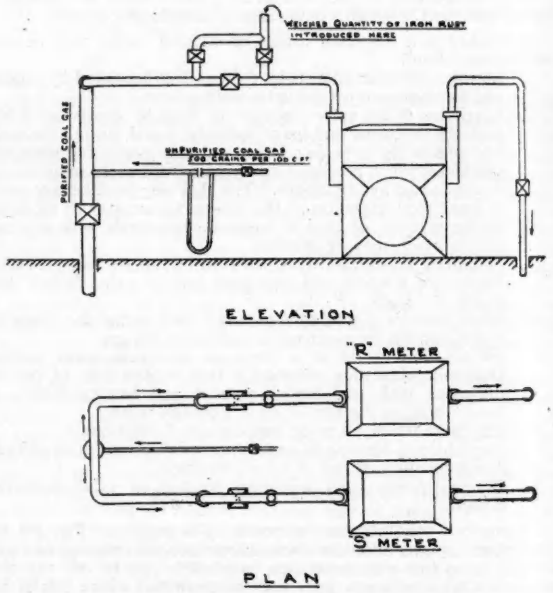

Fig. 9.—General arrangement of test connexions

On May 14, 1942, both meters were put to work, each at an approximate rate of 50 cu.ft. gas per hour. Unpurified gas containing 550 grains H_2S per 100 cu.ft. was added to the purified gas to the extent of 5%. The net H_2S content of the gas being metered was therefore 27 grains per 100 cu.ft.

After running continuously for 5 days, both meters were shut off and left standing for 18 hours, then restarted at the approximate rate of 200 cu.ft. per hour, and again run continuously at this rate

for a further 7 days. Both meters were then stopped and left standing for 24 hours.

After this time 2½ grammes of finely divided iron rust were introduced into each meter, and both meters restarted. After working continuously for a further 14 days, 2½ grammes of iron rust were again introduced into each meter, and they were then run continuously for a further five days. The meters at this stage were disconnected for the purpose of carrying out a second pressure absorption.

The meters had worked for 31 days with occasional standing periods. Five grammes of iron rust had been introduced into each meter, and in addition the purified gas being metered had been fouled with 5% impurified gas containing 550 grains H_2S per 100 cu.ft. continuously.

Results at end of 31 days.

TABLE A. Rotary valve meter "R" state 000000 } Date April 13, 1942
Standard meter "S" state 000000 }

Inlet tenths in.		Outlet tenths in.		Absorption tenths in.		Rate of flow cu.ft. per hour		Registration accuracy + or — %	
R	S	R	S	R	S	R	S	R	S
19	19	13	14	6	5	250	250	+1.0	—1.5
19	19	14	15	5	4	200	200	+1.0	—0.5
20	19	16	16	4	3	150	150	+1.0	—0.5
20	20	17	17	3	3	100	100	+1.25	Correct
20	20	18	17	2	3	60	60	Correct	—0.5
20	20	18	18	2	2	30	30	Correct	—0.5
20	20	19	18	1	2	6	6	+1.0	—3.5

Observation. The rotary meter as compared with the standard meter has a higher pressure absorption at higher rates of gas flow, and slightly lower pressure absorption at the lower rates of gas flow.
This indicates that there is too much frictional resistance to gas flow, and that the gasways within the meter are rather small and could with advantage be enlarged (rotary valve meter).
It also indicates that there is slightly less friction of valves and mechanism in the rotary meter as compared with the standard meter, which is to its advantage.

TABLE B. Rotary valve meter "R" state 120800 } Date June 16, 1942
Standard meter "S" state 122350 }

Inlet tenths in.		Outlet tenths in.		Absorption tenths in.		Rate of flow cu.ft. per hour		Registration accuracy + or — %	
R	S	R	S	R	S	R	S	R	S
18	19	12	15	6	4	250	250	+1.5	+1.0
19	19	15	16	4	3	200	200	+0.5	+2.0
19	19	16	16	3	3	150	150	+1.0	+2.5
20	20	17	17	3	3	100	100	+1.5	+2.5
20	20	18	17	2	3	60	60	+1.0	+2.5
20	20	18	18	2	2	30	30	+0.5	+2.5
20	20	18	18	2	2	6	6	+2.0	+1.0

Observation. Absorption of both meters very little affected
Registration { "R" meter averages 0.5% faster
"S" " " 3.0% } Compared with Test A

The meters were reconnected on the test bench and again put to work on June 19, 1942, at the average rate of 180 cu.ft. per hour.

For 12 days 5% unpurified gas was admitted as previously. On the 10th day fouling was discontinued and clean gas only metered. After a further six days both meters were stopped and left standing for 24 hours. The meters were then restarted at average rate of 50 cu.ft. per hour, and run continuously at this rate for a further 35 days.

On August 17 the rotary stopped dead, ceasing to function for reasons unknown.

It was evidently a sudden failure, rather than a gradual one, and could not, therefore, be the result of valve sticking. This is revealed by the daily log of the test which showed that the meter passed the full quantity of gas, and without any slowing down until failure occurred.

Both meters were disconnected for examination.

"R" meter.—The case top was carefully removed and the cause of stoppage was found to be strain and dislocation of flag wire, probably due to fouling of mechanism.

This happening was most unfortunate as it prevented taking an absorption and registration test, besides putting an end to the running test. A bench repair was indicated, and any test after this would be useless and in no way indicative. The spindle and drive were carefully disconnected and removed, leaving the valve plate on the valve grid. By finger drive it was observed that the valve was quite free, without binding or drag, and its motion could not in any way have caused the stoppage.

Motion—Smooth and Free

The valve plate was carefully lifted from off the valve grid and laid aside in an upturned position. Visual examination in a clear light revealed both valve plate and valve grid bright and polished with only very few fine streaks and traces of foreign matter on the sliding faces. At this stage the "R" meter was laid aside and covered.

"S" meter.—Attention was now given to the standard type meter. Before opening up for examination, a pressure absorption and registration test was carried out with the following results:

Table C standard meter "S" state 246300. After 84 days working

Inlet tenths in.	Outlet tenths in.	Absorption	Rate of flow cu.ft. per hr.	Registration + or — %
19	14	5	250	—1.0
19	15	4	200	+0.5
19	15	4	150	+0.5
20	15	5	100	+0.5
20	16	4	60	+0.5
20	16	4	30	+1.5
20	16	4	6	Standing

Observations. (Compared with results after 31 days working Table B).
1. Pressure absorption had increased, especially at low rate of gas flow, when increase was 100% compared with results after thirty-one days working.
2. Registration averaged 2% slower, while the meter did not function at the flow rate of 6 cu.ft. per hour.

The meter was now opened up for examination.

The case top was careully removed. The spindle, crank and drives were carefully disconnected and removed, leaving the valve plates on the valve grids. By finger drive it was observed that each valve had a decided drag accompanied with varying resistance over the length of travel, a condition in fact which might be expected from observations on test results C.

The valve plates were then carefully lifted from off the valve grids and laid aside in an upturned position. Visual examination in a clear light revealed both valve plates and valve grids, dull and all but nearly covered with a blackish greasy deposit in the form of streaks and grooves with accumulations of deposits overhanging edges of faces.

General Conclusions

Due to premature breakdown of test, there were no wholly conclusive findings, but the results were, to some extent, indicative.

It appears that the rotary valve of the "R" meter had stood up to the test better than the reciprocating valves of the "S" meter, and if it had been possible to continue the test, the valves of the "S" meter would have failed to function sooner than the rotary valve of the "R" meter, under the drastic conditions of test, and also that the increasing tendency to register "slow" was making itself more apparent with the "S" meter, rather than with the "R" meter.

It was very unfortunate that the test had to prematurely terminate, and more unfortunate still that it was not possible to obtain a final pressure absorption and registration test on the "R" meter. In order to record the visual observations, the valve grid and valve plate faces of both meters were photographed, Figs. 10 and 11. The valve faces were in no way touched or disturbed, and the photographs are a record of the valves' appearances when the cases were first opened out at the conclusion of the test.

From photograph Fig. 10 of the rotary valve meter observe:

General appearance.—Faces of valve grid and plate bright and reasonably clean.

Valve plate.—Note on the upturned valve plate the track of the grid circumferential faces, apparent as a light coloured band against a darker background, denoting the exclusion of foreign and deleterious matter from between the sliding faces.

From photograph Fig. 11 of the standard valve meter observe:

General appearance.—Faces of valve grid and plate dull.

Valve covers.—Very streaky and dull, note streaky deposit over whole surface.

Valve grids.—Streaky deposits particularly on longitudinal sliding surface, as distinct from cross surfaces.

From Fig. 9 showing the test set up it will be seen that there is a common inlet pipe, from which independent but identical branches to each meter inlet are connected. The main control to both meters is on the common inlet pipe. This arrangement provides for some interesting observation. If the pressure absorption of each meter was the same with the same rate of flow, and the accuracy of the meters was the same, then the gas passed by each meter would be the same, and the registrations over a period would be identical. If, on the other hand, one meter had a greater pressure absorption than the other with the same rate of flow, the resistances would automatically balance, and the differences would be reflected in the registration.

Also, in any given period, a change in resistance to gas flow or pressure absorption of one meter compared with the other should also make itself apparent in a comparison of the registration of each meter over the period. A study on these lines of the daily records of the test reveals the following:

1. For the first five days of the test, the main control was set for the approximate rate of 50 cu.ft. per hour to each meter. At the end of the five-day period, the " R " meter had passed 7,800 cu.ft., and the " S " meter had passed exactly the same volume as registered, *i.e.*, 7,800 cu.ft.

   This indicates that at the commencement of test with a flow of approximately 50 cu.ft. per hour, both meters had a like performance.

2. For the next 44 days of the test, the main control was set for the approximate rate of 200 cu.ft. per hour to each meter.
   During this period the " R " meter had passed 187,600 cu.ft. while the " S " meter had passed 196,800 cu.ft., indicating that the " R " meter offered greater resistance than the " S " meter at this higher rate of flow. This is confirmed in the pressure absorption and registration tests set out in tables A and B.

3. For the next and last 35 days of the test, the main control was again set for the approximate rate of 50 cu.ft. per hour to each meter, as in the first 5 days of the test, seven weeks earlier. During this period the " R " meter had passed 44,600 cu.ft. and the " S " meter had passed 41,700 cu.ft.

Whereas then in the first five days of the test with a flow rate of approximately 50 cu.ft. per hour, both meters had identical registrations, now with the same approximate flow rate, the " R " meter passed more gas in the same period of time than the " S " meter, indicating that the performance of the " S " meter was falling away from the performance of the " R " meter and thus confirming previous indications.

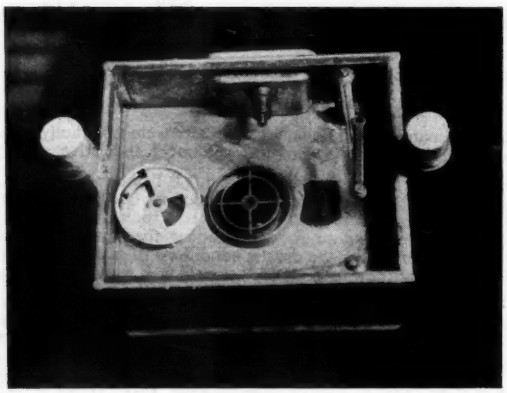

Fig. 10

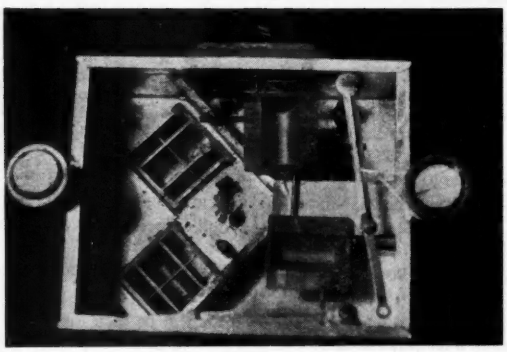

Fig. 11

A small high capacity meter with rotary valve was made, with improved gasways in order to lessen absorption and improve performance. A bench test on this meter gave the following results:
Size 200 ft. flow. Type—ordinary rotary S.H.C. Capacity per revolution 0.2 cu.ft. Test circle 2.0 cu.ft. Inlet test pressure 20 tenths water gauge. Tested on gas.

Rate per hour cu.ft.	Absorption				Test holder registration cu.ft.
	Max.	Min.	Osc.	Mean	
5	.195	.100	.095	.145	2.01
10	.200	.110	.090	.150	2.01
20	.205	.120	.085	.165	1.99
30	.210	.120	.090	.165	1.99
40	.210	.130	.080	.170	1.99
50	.200	.135	.075	.165	1.99
60	.205	.140	.065	.175	1.99
70	.210	.145	.065	.175	1.99
80	.210	.150	.060	.180	1.99
90	.220	.160	.060	.190	1.99
100	.225	.165	.060	.195	1.99
150	.260	.215	.045	.235	1.99
200	.300	.265	.035	.285	1.99
250	.350	.320	.030	.335	1.99
300	.430	.400	.030	.415	1.99
400	.590	.565	.025	.575	1.98
450	.710	.690	.020	.700	1.98
500	.830	.810	.020	.820	1.98
600	1.160	1.150	.010	1.155	1.98
870	Open outlet				2.01

A further S.H.C. 200 cu.ft. meter with rotary valve fitted was put to work in consumer's premises on the supply of a London gas company where meter trouble was being experienced owing to blitzes. The mains were in very bad condition and all sorts of impurities finding their way into the meters.

After a period of 15 months, when the meter had passed 570,075 cu.ft., the meter was disconnected and returned to the maker's works, where it was immediately subjected to a bench test. The result of this test, together with the examiner's comments, are as follows:

Size and capacity 200 cu.ft. per hour. Meter No. 1681652. Type—S.H.C. rotary valve ordinary. Capacity per revolution 0.2 cu.ft. Test circle 2.0 cu.ft.

Duration of test.—Commenced March 9, 1944. Index zero. Disconnected June 1, 1945. Index 570,075 cu.ft. Inlet pressure 20/10 in. water gauge.

Rate per hour cu.ft.	Absorption				Test holder registration cu.ft.
	Max.	Min.	Osc.	Mean	
20	0.36	0.24	0.12	0.30	2.10 = 5% fast
60	0.34	0.16	0.18	0.25	2.00 = Correct
100	0.31	0.19	0.12	0.25	2.00 = Correct
120	0.30	0.22	0.08	0.26	2.10 = 5% fast
150	0.30	0.24	0.06	0.27	2.02 = 1% fast
200	0.34	0.32	0.02	0.33	2.04 = 2% fast
250	0.44	0.40	0.04	0.42	2.03 = 1.5% fast
300	0.49	0.46	0.03	0.475	2.03 = 1.5% fast

As the final test figures show, the meter was working satisfactorily when disconnected, and if anything the absorption figures were better than at the commencement of the test. When the top was removed a powder deposit was found on the valve plate and in the side pipes, but the condition of the valve face was excellent, particularly the circumferential faces which were polished, the radial bars being not quite so good.
The surface of the valve cover had worn in circumferential grooves corresponding to the grating surfaces and a black deposit had built up on approximately one quarter of the contacting surfaces, and when turned by hand a slight drag could be felt.

Since the above test no further meters with rotary valves have been made, but it is our intention, as soon as conditions permit, to have a quantity of this type of meter made and put to normal working on the district, when further observations will be made.

Coventry and the Future

At the invitation of the Gas Committee the members of the Coventry City Council inspected the gas-works last week and were afterwards told that the Gas Committee, which administers the sixth largest municipal gas undertaking in England, was not perturbed at the prospects of nationalization.

The Mayor, Councillor J. C. Lee Gordon, speaking at a luncheon following the visit, said he hoped the Coventry undertaking would be given the consideration it deserved and be preserved as one of the major producing units of the grid at which, he presumed, any scheme of nationalization would aim. Since the war began its productive capacity had been increased from 15¼ million to 19¾ million cu.ft. of gas. The Corporation bought the undertaking (which had originated in 1820) for £174,000 in 1884, when its annual production was equivalent to 14 days' output at present, and whereas the price of gas to the consumer was once 18s. 5d. it was to-day 4s. 7d. per 1,000 cu.ft.

Alderman J. Howat, Chairman of the Gas Committee, said that despite heavy increases in production and other costs the price of gas had increase by less than 40% over the pre-war rate. In regard to nationalization, he said the undertaking was capable of serving a much bigger area than Coventry, and he hoped that such an undertaking would not be materially affected by nationalization.

Mr. J. E. Wakeford, Engineer and Manager, said the future of the Industry was veiled, but it seemed likely that nationalization would be based on the Heyworth Report, under which there would be ten regions with a number of central manufacturing stations. They were anxious that Coventry should be one of those stations.

Speaking at the end of the inspection. Mr. F. J. Edmunds, Regional Gas Officer, said the works was run with an efficiency that was second to none in the United Kingdom.

COMPANY MEETING

George Wilson Gas Meters, Ltd.

The Tenth Ordinary General Meeting of George Wilson Gas Meters, Ltd., was held at Coventry on Oct. 29, 1946.

The CHAIRMAN, Mr. Walter Derrick Wilson, B.E.M., in moving the adoption of the Report and Accounts, said:

Though, during the year under review, hostilities were fortunately brought to a victorious end, the Government contracts on which your Company was engaged continued on a diminishing scale throughout the year, and have even extended into the current period. The profits disclosed by the accounts arose mainly from these contracts, and, therefore, while such profits may be regarded with reasonable satisfaction, they must not be taken as an indication of the results accruing from our normal peace-time trading to which we are now endeavouring to revert.

The difficulties and uncertainties of the transitional period, to which I referred last year, are unfortunately still very much in evidence. Nationalization looms ahead. Industry is placed in a similar position to an Army Commander in knowing that an attack is to be launched but having no knowledge of where, when, how, or with what forces. In consequence, the embarrassment experienced in planning a campaign will readily be understood. In addition, we are constantly being faced with increasing costs of every description, together with a serious shortage of all kinds of materials. Negotiations affecting wage rates are proving long and complicated, and it is still not generally realized that increases in wage rates without a corresponding increase in production merely result in higher prices all round, thus discounting the anticipated advantages of the larger pay packets. Furthermore, the general rise in costs, whether of labour, materials or other items, will have a severely prejudicial effect on the recovery of our export trade on which the prosperity of this country so much depends. It grieves me to have to paint such a discouraging picture but, surrounded as we are with so many complications, I find it impossible to take a very optimistic view of the future.

Partly with the object of minimizing the difficulties to which I have referred and also to facilitate the development and expansion of your Company's interests, the Board have decided upon a policy of extending our manufacturing activities in other parts of the country. As a result of this decision, arrangements have been made to dispose of a part of the present factory space at Coventry, while larger and more attractive premises have been secured in Manchester, and negotiations are on foot for the lease of a commodious factory which is now in course of construction at Jarrow. A substantial amount of production will continue to be carried on at Coventry, where it is proposed that our Head Office will remain. Your Directors hope that in due course these developments will prove beneficial to your Company.

Before I conclude, I should like to refer to the resignation of Mrs. I. R. Amor from the Board of Directors, after completing thirty-one years with the Company, in its present and previous forms, in the course of which she was not only a most enthusiastic servant but a loyal friend and colleague.

I must also mention the new appointments to the Board, which you will shortly be asked to confirm, namely, Mr. F. C. Wilson, Mr. W. A. Dobson and Mr. G. E. Withers. Each of these gentlemen has served the firm for many years and, while in no way wishing to influence your decision, I must state that, in the difficult times through which we have passed, and are passing, their whole-hearted assistance, enterprise, and co-operation have been invaluable to the Company. I may add that these remarks apply equally to Mr. D. C. E. Poole who retires by rotation at this meeting.

The Report and Accounts were adopted and a dividend of 10%, less income tax, on the Ordinary shares was declared. The retiring Directors were re-elected and the Auditors, Messrs. Daffern & Company, were re-appointed.

Gas Undertakings' Results

Stretford and District Gas Board.—Fears that the termination of war industries might adversely affect the prosperity of the undertaking have to a very large extent proved groundless, states Mr. J. Grayson, Engineer, General Manager and Clerk, in his report for the year ended Mar. 31. Gas sales, at 1,833,268,800 cu.ft., showed a decrease of 2.2%. The actual decrease in the industrial load was 10.44% but to counterbalance this there was an increase of 6.4% in domestic sales. Unaccounted for gas rose from 5.43% to 6.64%, due in a large measure to arrears of meter repairs. Much was done by the Industrial Department during the year to offset the effect of the closing down of war factories, and several new uses for gas for industrial purposes were introduced, certain of which show promise of developing into very valuable consumers. The gross revenue profit was £96,142, against £131,533, and the balance to appropriation account was £4,893, compared with £23,989 in the previous year.

South Australian Gas Company.—The 85th annual report, covering the twelve months ended June 30, records a trading profit of £141,973. Gas sales amounted to £638,272, and total revenue was £872,082; total expenditure was £757,105. A dividend of 5% has been paid and £66,667 has been transferred to special purposes fund, leaving a carry-forward of £58,591, against £53,285 brought in.

Coatbridge Gas Company.—Gas sales during the year ended June 30 amounted to £116,945, and the balance carried to profit and loss account was £15,797. Interim dividends were paid in February at the rate of 5% actual on the Original stock and 3½% actual on the four issues of £10 shares, and at the annual meeting on Sept. 17 final dividends were declared at the rate of 9½% on the Original stock and £6 9s. 6d.% on the four issues of £10 shares, all less tax.

Smethwick Gas Department.—A gross profit of £42,121, reduced to a net credit balance of £13,150 after payment of net revenue charges, was made last year, but the annual report contains a hint that gas charges may shortly have to be increased. The last general increase was in 1941 and since then, it is stated, considerably higher costs have had to be met for coal, materials and wages, and an increase in expenditure which will have to be borne during the current year will make it necessary for the Gas Committee to consider a revision of the scale of charges, a step which " has been deferred for as long as could reasonably be expected."

Sowerby Bridge Gas Department.—Gas sales during the year ended Mar. 31 reached 264,597,000 cu.ft., an increase of 6% over the previous year and a record for the Department. The demand for domestic appliances continued to be far greater than the supply available, and there was an increase of 78% in the total value of appliances sold through the showroom. There was a net surplus of £1,164 for the year. Public lighting was resumed to the extent of 100% in the case of electricity and 95% in the case of gas, shortage of materials, particularly mantles, prohibiting the full resumption of gas street lighting. Mr. W. B. Harrison, Engineer and Manager, states in his report that as labour and materials become available an increasing amount of work will have to be carried out in the distribution system to ensure satisfactory supplies of gas throughout the area.

Warrington Gas Department.—In his first report as Engineer and Manager, Mr. W. H. T. Johns records an increase of 7.23% in the sales of gas for the year ended Mar. 31. Net profit was £6,277, compared with £22,288 for the previous year, increased expenditure having been due to rises in the cost of coal, increases in wages and materials, and to substantial expenditure incurred in dealing with delayed maintenance of works and plant. Very heavy maintenance costs will be involved over the next few years in bringing the plant and distribution system into an efficient state of repair. The programme of capital works and reconstruction, as already scheduled for the next few years, will reveal a modern gas-works with up-to-date mechanical and labour-saving machinery. With the termination of wartime contracts it was feared there would be some falling off in industrial gas sales, but the industrial load showed an actual increase, and it is anticipated that when the carbonizing plant is available there will be a large potential market for gas in industry. Appliances sold through the showrooms totalled 1,897, against 877, worth £12,707, against £4,695.

Walsall Gas Department.—The report for the past year shows total working expenses amounting to £262,204 and an income of £326,948, including £196,341 from sale of gas and £80,944 from the sale of residuals. There was agr oss profit of £64,744 and after payment of all charges there was a net figure of £25,067. The sum of £1,945 was granted for the relief of the rates and there was a balance of £39,902 to be carried forward. The quantity of gas sold and accounted for during the year was 983,135,000 cu.ft., an increase of 7.05% on the previous year, and the highest recorded in the history of the undertaking. The average price of gas for all purposes was 10.85d. per therm, and although the cost of materials and labour had substantially increased during the past few years, the price of gas for domestic and industrial purposes had not been raised since 1940. Moreover, the increased quantity of gas had been produced in the old gas-works plants without any addition to gasmaking units. The weight of coal carbonized was 55,687 tons, an increase of 3,100 on the previous year, and the average price was 45s. 10.55d. per ton. " In spite of all difficulties and the ever increasing cost of labour and materials," the report adds, " the trading results are in many respects the best in the history of the undertaking."

An Ordinary Dividend of 10% was declared at the tenth annual meeting of George Wilson Gas Meters, Ltd., at Coventry, on Oct. 29. The profit for the year ended Mar. 31, after providing for all expenses of administration, depreciation, and Directors' fees, but before providing for taxation, amounted to £28,588, compared with £16,493 for the previous year. These profits arose in the main from Government contracts on which the Company has been largely engaged throughout the year under review. The Directors' report stated that the Company was going through an extremely difficult period of transition from war production to normal trade activities, in the course of which innumerable obstacles were being encountered, not the least of these being the shortages and constantly increasing costs of raw materials and components.

North of England Association

Over 80 representatives of Northern gas undertakings attended the Autumn General Meeting of the North of England Gas Managers' Association at the Seaburn Hotel, Sunderland, on Oct. 25, under the Presidency of Mr. C. C. Walmsley, Managing Director and Secretary of the Sunderland Gas Company.

The meeting was preceded by a visit to the Hendon Works of the Company, where members were especially interested in the new installation of overhead purifiers having a capacity of some 3 million cu.ft. per day. Later, members were the guests of the President at lunch.

After the meeting, a visit was made to the Wear Glass Works of James A. Jobling & Co., Ltd., and tea was provided at the invitation of Mr. E. J. Jobling-Purser.

Among the principal guests attending the meeting was Mr. Thomas Hornsby, who retired at the end of October from the position of Durham Regional Fuel Controller. Mr. Hornsby, who before taking up that position was independent Chairman of the Durham Coal Sales Control Committee, has considerable knowledge of the Gas Industry because of his wide experience in the sale of Durham gas and coking coal and the fixing of its prices.

His remarks on the proposed nationalization of the coal and allied industries were followed with particular interest by the members. In his opinion this policy of nationalization is a "huge mistake." Industry in this country, he recalled, had been built up by private venture. He did not favour nationalization of coal, gas, electricity, transport, or any other industry, and he had yet to be satisfied that the coal industry was to prosper under nationalization.

Mr. Walmlsey's Presidential Address, which will be reported in a later issue of the "JOURNAL" was received with acclamation.

Hawick is to have a branch of the Women's Gas Council. Decision to form the branch was taken at a meeting of townswomen held in the Library Hall on Oct. 23, at which a talk on the scope of the Council's work was given by Mrs. Abbott, Organizing Secretary of the Council. Mrs. Fraser, wife of the Provost, was elected Chairman. The Committee will draw up a programme for the first open night, when plans for the future will be discussed.

Johannesburg Wants to Know

The City Council of Johannesburg has agreed to send Mr. J. G. Curnow, Engineer and Manager of the Gas Department, to Great Britain and Europe to investigate and obtain information on (1) the trend in design and practice as a result of research which may affect the future development of the Johannesburg works; (2) the operation and maintenance of gas plants similar to or comparable with the Johannesburg works; (3) the treatment and effective use of by-products, tar, and coke; (4) the operation of a gas drying plant; (5) the various methods used in the distribution of gas and the upkeep of consumers' appliances; (6) sales and propaganda systems; (7) methods employed by factories engaged in the manufacture of gas-making and by-product plants; (8) methods employed by factories engaged in the manufacture of domestic and industrial gas appliances, meters, cookers, &c.; and (9) generally any matter which has a practical bearing on the efficient working of the Council's gas-works.

Mr. Curnow expects to sail about the end of February and to be away for four months, which means that he will have approximately ten weeks in which to complete his task in respect of a number of gas-works in Great Britain and Ireland, together with factories manufacturing appliances, &c. He hopes during his stay in Great Britain to meet as many brother gas engineers as he can, and will appreciate whatever co-operation they can offer in order to make his visit as instructive as possible.

Complete New Works are needed by the St. Ives (Hunts) Gas Company for the manufacture of gas, but as the licence for the work cannot be obtained it is now necessary for the Company to buy gas. An alteration in the articles of association of the Company to enable this to be done has been confirmed by Mr. Justice Wynn-Parry in the Chancery Division.

Falkirk Gas Department is to erect three new purifier boxes and to convert the existing plant at the gas-works. The cost of the extension is £27,320, excluding the cost of foundations, handling plant, excavations and drains, for which separate tenders will be taken. The Gas Committee has also approved of the installation of a skip hoist for the transport of coke and other items, to cost £1,725

GAS PRODUCTS PRICES

The London Market

November 5.

There is no change to report regarding Coal Tar products, either as to prices or the general market position.

Home market requirements continue heavy and contracts for some of the products are now being booked to cover the first half of 1947.

The Provinces

November 5.

Average prices of gas-works products: Pitch, 75s. per ton; toluole, naked, North, 90's, 2s. 4d. to 2s. 6¾d. per gallon; pure, 3s. 2¼d. Prices for carbolic acid 60's, anthracene, creosote oil (hydrogenation), coal tar oils (timber preservation, &c.), and strained anthracene oil are controlled by Government Orders. Prices for road tar were increased by a half-penny per gallon by S. R. & O. 1945, 229, under which Order there was also an increase of 5s. per ton in the price for standard creosote-pitch mixture.

Scotland

November 2.

Market is short of supplies, particularly for export.

*Refined Tar.** Yield to the Distiller is 5d. per gall. ex works, naked. *Creosote Oil.* Timber preserving quality,* 5½d. to 6½d. per gall.; Hydrogenation Oil,* 5¾d. per gall.; Low Gravity or Virgin Oil,† 7¾d. to 7½d. per gall. ; Benzol Absorbing Oil, 6½d. to 8d. per gall. *Refined Cresylic Acid** is 3s. 6d. to 4s. 6d. per gall. ex works, naked, according to quality. *Crude Naphtha,*† 7d. to 8d. per gall. *Solvent Naphtha.** Basic maximum prices delivered in bulk, 90/160 grade, 2s. 10d. per gall. and 90/190 Heavy Naphtha, Unrectified, 2s. 0½d. per gall.; Rectified, 2s. 4d. per gall. *Pyridine,*† 90/160 grade, 15s. per gall., and 90/140 grade, 17s. per gall.

* Price controlled. † Uncontrolled.

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Price 7s. 6d. post free; 12 copies, to one address, 75s.

GAS STOCKS AND SHARES

The increased activity continued in most sections of the Stock Exchange last week. All the nationalization groups were again firm, and heavy reinvestment buying on sales of Local Loans was in evidence. British Funds were particularly strong and with the hunt for yields the prices of Corporation and Dominion Government Loans went further ahead. The announcement of more favourable dividends gave a fillip to the industrial section.

The turnover in the Gas Market was heavier than during the previous week and it will be seen below that another long list of gains is recorded. The features were the rises of 4 points in both Commercial and South Metropolitan Ordinaries while South-Eastern 4½% Preference closed 2s. 6d. higher. A number of fixed-interest stocks in the Supplementary List were also marked up to bring them into line with current values. Despite the higher prices, however, the yield on a number of gas stocks is still attractive. The following is the full list of price movements up to Thursday last:—

SUPPLEMENTARY LIST

Brighton 5 p.c. deb....	122	—127	+ 2
Bristol 4 p.c. new deb.	102	—105	+ 1
Malta & Mediterranean 7 p.c. 1st pref.	100	—110	+ 5
Newport (Mon.) 5 p.c. deb. ...	120	—125	+ 2
Plymouth & Stonehouse 5 p.c. deb.	120	—125	+ 5
Reading 4 p.c. deb.	100	—105	+ 2
Romford 4 p.c. deb....	100	—105	+ 1
Uxbridge 5 p.c. deb	120	—125	+ 2

OFFICIAL LIST.

Assocd. Gas & Water ord. xd	19/6	— 20/6	Oct. 28
Do. deferred ... ... xd	20/	— 21/	Oct. 28
Do. 4½ p.c. red. cum. pref.	21/	— 23/	+ 1/
Bombay...	44/	46/	+ 6d.
Bournemouth 7 p.c. max.	157	—162	+ 2
Commercial ord.	77	— 82	+ 4
Gas Light units	22/9	— 23/9	- 3d.
Do. 3½ p.c. max.	87	— 90	+ 1
Do. 3 p.c deb.	102	—105	+ 2
Do. 3¼ p.c. red. deb. ...	101	—104	+ 1
Imperial Continental ord.	112	—117	- 1
Oriental	237	—247	+ 2
South Eastern Gas Corpn. ord. ...	20/6	— 22/6	+ 9d.
Do. 4½ p.c. red. cum. pref.	22/	— 24/	+ 2/6
South Metropolitan ord.	98	—101	+ 4
South Suburban 5 p.c. deb. ...	123	—128	+ 2
Tottenham 4 p.c. deb.	103	—108	+ 3
Wandsworth 5 p.c. deb.	123	—128	+ 2
Do. 4 p.c. deb.	103	—108	+ 3

Quotations on the London and Provincial Stock Exchanges

OFFICIAL LIST

Issue. £	When ex-Dividend	Dividends Interest. Amnt. or Rate %: Prev. Hf. Yr. Actual.	Last Hf. Yr. Actual.	NAME.	Quotations Oct. 31
1,767,439	Sept. 9	30/-	40/-	Alliance & Dublin Ord. ...	23/—25/-
900,018	Oct. 28	6d.	6d.	Assocd. Gas & Water U'd'ts Ord.	19/6—20/6
389,000	,,	7½d.	7½d.	Do. Deferred	20/—21/-
500,000	Sept. 9	2½	2½	Do. 4½ p.c. Red. Cum. Pref.	21/—23/-
536,000	,,	2	2	Do. 4 p.c. Red. Cum. Pref.	19/—21/-
342,000	,,	2	2	Do. 4 p.c. Irred. Cum. Pref.	19/—21/-
561,370	Aug. 19	70/-	70/-	Barnet Ord. 7 p.c.	158—163
300,000	June 11	8¾d.	1/3¾d.	Bombay, Ltd.	44/—46/-
690,526	Aug. 19	70/-	70/-	Bournemouth 7 p.c. max. ...	157—162
362,025	June 11	2	2	Do. 4 p.c. Deb. ...	107—112
659,955	Aug. 26	50/-	50/-	Brighton, &c., 5 p.c. Con. ...	105—110
855,000	Sept. 30	90/-	70/-	Brit. Gas Light Ord.	120—125
545,000	July 1	2⅜	2⅜	Do. 5½ p.c. 'B' Cum. Pref.	109—114
120,000	June 17	2	2	Do. 4 p.c. Red. Deb. ...	97—102
100,000	Oct. 21	2½	2½	Cape Town, Ltd., 4½ p.c. Cu. Pf.	17/—19/-
626,860	July 15	70/-	50/-	Cardiff Con. Ord.	120—125
24,500	June 3	8⅝d.	8⅝d.	Colombo 7 p.c. Pref.	23/6—25/6
764,169	Sept. 23	6d.	6d.	Colonial Gas Assn. Ltd. Ord. ...	17/—19/-
400,000	,,	9⅜d.	9⅜d.	Do. 8 p.c. Pref. ...	23/—25/-
1,748,090	Aug. 6	40/-†	30/-	Commercial Ord.	77—82
620,000	June 11	1½	1½	Do. 5 p.c. Deb.	87—92
286,344	Aug. 19	2½	2½	Do. 5 p.c. Deb.	115—120
807,560	,,	60/-	60/-	Croydon sliding scale	120—125
644,590	,,	50/-	50/-	Do. max. div.	102—107
620,385	July 1	2½	2½	Do. 5 p.c. Perp. Deb. ...	120—125
179,500	Aug. 26	50/-	50/-	East Surrey 'B,' 5 p.c.	101—106
176,461	June 24	2½	2½	Do. 5 p.c. Deb. (Irred.) ...	120—125
239,135	Aug. 26	6d.	6d.	Gas Consolidation Ord. 'A' ...	19/9—20/9
250,000	,,	4⅛	4⅛	Do. Ord. 'B' ...	19/—21/-
250,000	May 13	2	2	Do. 4 p.c. Red. Cum. Pref.	18/6—20/6
19,101,877	Aug. 6	6d.	6d.	Gas Light & Coke Ord. ...	22/9—23/9a
2,600,000	,,	35/-	35/-	Do. 3½ p.c. max.	87—90
4,477,106	,,	2	2	Do. 4 p.c. Con. Pref. ...	103—106
2,993,000	July 8	1¾	1¾	Do. 3¾ p.c. Red. Pref. ...	103—106
8,602,497	May 27	1½	1½	Do. 3 p.c. Con. Deb. ...	102—105
3,642,770	,,	2½	2½	Do. 5 p.c. Red. Deb. ...	106—109
3,500,000	,,	2½	2½	Do. 4½ p.c. Red. Deb. ...	106—109
700,000	Sept. 9	1⅝	1⅝	Do. 3½ Red. Deb.... ...	101—104
5,600,000	May 27	†£10	†£8	Imperial Continental Cap. ...	112—117
43,340	July 29	1¾	1¾	Do. 3½ p.c. Red. Deb. ...	98—101
2,167,410	Aug. 6	55/-	55/-	Liverpool Ord.	112—117
231,978	,, 19	50/-	50/-	M.S. Utility 'C' Cons.	103—108
918,657	,,	2	2	4 p.c. Cons. Pref.	102—105
675,000	April 29	‡40/-	‡40/-	Montevideo, Ltd.	120—125
300,000	May 6	£6	‡£3	Oriental, Ltd.	237—247
368,537	June 11	50/-	57/6	Plymouth & Stonehouse 5 p.c.	109—114
621,667	Aug. 19	72/6	72/6	Portsmouth & Gosport Cons.	145—150
2,386,371	June 24	†9⅜d.	†4¾d.	Primitiva Holdings, Ltd. Ord.	11/—13/-
226,860	June 17	3	3	Do. 6½ p.c. Red. Cum. Pref.	100—105
648,999	Sept. 9	6⅜	6⅜	Severn Val. Gas Cor. Ld. Ord.	21/—23/-
597,972	,,	2½	2½	Do. 4½ p.c. Cum. Pref. ...	20/6—22/6
2,528,714	Aug. 26	8⅜d.	3⅜d.	South East'n Gas Cn. Ld. Ord.	20/6—22/6
1,000,000	,,	2½	2½	Do. 4½ p.c. Red. Cum. Pref.	22/—24/-
1,068,869	,,	2	2	Do. 4 p.c. Irred. Cum. Pref.	21/—22/-
6,709,895	Aug. 19	50/-	40/-	South Met. Ord.	98—101
1,135,812	,,	3	3	Do. 6 p.c. Irred. Pref. ...	122—127
850,000	,,	2	2	Do. 4 p.c. Irred. Pref. ...	101—105
1,895,445	July 1	1½	1½	Do. 3 p.c. Perp. Deb. ...	95—98
1,000,000	July 15	2½	2½	Do. 5 p.c. Red. Deb. ...	100—105
1,543,795	July 29	50/-	50/-	South Suburban Ord. 5 p.c. ...	105—110
512,825	,,	2½	2½	Do. 5 p.c. Perp. Pref. ...	108—113
500,000	,,	2	2	Do. 4 p.c. Perp. Pref. ...	100—105
250,000	,,	1¾	1¾	Do. 3¾ p.c. Red. Pref. ...	99—104
888,587	June 17	2½	2½	Do. 5 p.c. Perp. Deb. ...	123—128
750,541	Aug. 12	50/-	50/-	Southampton Ord.	105—110
350,000	,,	2¾	2¾	Swansea 5½ p.c. Red. Pref. ...	102—107
127,288	Sept. 16	83/9	50/-	Swindon Ord.	117—122
1,076,490	Aug. 6	50/-	50/-	Tottenham & District Ord. ...	105—110
338,555	,,	2½	2½	Do. 5 p.c. Pref.	107—112
453,380	June 17	2	2	Do. 4 p.c. Perp. Deb. ...	103—108
1,483,664	June 3	7½d.	6d.	U. Kingdom Gas Cor. Ord. ...	23/—24/-
1,085,952	May 13	5⅝d.	5⅝d.	Do. 4½ p.c. 1st Cum. Pref. ...	21/—23/-
772,709	,,	4⅝d.	4⅝d.	Do. 4 p.c. 1st Red.Cum.Pref.	20/6—21/6
745,263	Dec. 17	5⅝d.	5⅝d.	Do. 4½ p.c. 2nd Non.Cum.Pf.	20/—22/-
1,200,000	Sept. 16	1⅞	1⅞	Do. 3½ p.c. Red. Deb. ...	103—108
380,608	Aug 19	66/3	66/3	Uxbridge, &c., 5 p.c.	128—133
1,371,138	July 29	50/-	50/-	Wandsworth Consolidated. ...	105—110
2,525,768	,,	2	2	Do. 4 p.c. Pref.	101—105
1,343,964	June 17	2½	2½	Do. 5 p.c. Deb.	123—128
383,745	,,	2	2	Do. 4 p.c. Deb.	103—108
558,342	Aug. 6	50/-	50/-	Watford & St. Albans Ord. ...	105—110

SUPPLEMENTARY LIST

Issue. £	When ex-Dividend.	Dividends Interest. Amt. or Rate %: Prev. Hf. Yr. Actual.	Last Hf. Yr. Actual.	NAME.	Quotations Oct. 31
351,685	June 17	2½	2½	Brighton, &c., 5 p.c. Perp. Deb.	122—127
415,250	,,	2	2	Bristol Gas Co., 4 p.c. New Deb.	102—105
140,205	July 29	70/-	70/-	Cambridge, &c., 7 p.c. Cons. 'B.'	135—140
295,932	Aug. 19	50/-	50/-	Cheltenham, 5 p.c. Cons. Ord.	104—109
42,500	June 17	2	2	Do. 4 p.c. Perp. Deb.	100—105
150,000	Aug. 19	2	2	Croydon Gas, 4 p.c. Pref. (Irr.)	99—104
130,000	July 1	2	2	Do. 4 p.c. Deb.	100—105
53,220	Aug. 26	3	3	East Surrey, 6 p.c. Cum. Pref....	122—127
198,000	Aug. 19	70/-†	25/-	Eastbourne 'B' 3½ p.c.	95—100
117,425	Feb. 25	—	6⅜†	East Wight Cons. 5 p.c. ...	110—120
156,600	Aug. 19	50/-	50/-	Hampton C't, 5 p.c. Cons. Ord.	107—112
18,000	Aug. 12	3½	3½	Malta & Med'n., 7 p.c. 1st Pref.	100—110
50,000	Aug. 19	52/3	52/3	Mid South Util. 'A' Cons. 5 p.c.	105—110
70,380	June 24	2½	2½	Newport (Mon.) 5 p.c. Deb. ...	120—125
65,000	Aug. 19	2½	2½	North Middlesex 5 p.c. Pref. ...	106—111
70,000	Sept. 16	2½	2½	Plymouth & Stone., 5 p.c. Deb.	120—125
76,501	June 24	2	2	Reading, 4 p.c. Perp. Deb. ..	100—105
74,777	Sept. 30	2	2	Romford, 4 p.c. Debs. (Reg.) ...	100—105
363,575	July 1	2½	2½	Tottenham, 5 p.c. Reg. Red. Mt.	98—101
202,019	Sept. 23	75/-	75/-	Tunbridge Wells, 4 p.c. Scale...	137—142
135,257	June 17	2½	2½	Uxbridge &c., 5 p.c. Perp. Deb.	120—125

PROVINCIAL EXCHANGES

					Quotations Oct. 25
804,948	July 29	2½	2½	Bath Cons.	113 —115
122,577	Aug. 12	4	3	Blyth 5 p.c. Ord....	122 —124
1,667,250	July 22	2½	2½	Bristol, 5 p.c. max.	114½—116½
120,420	June 17	2	2	Do. 1st 4 p.c. Deb.	101 —104
415£250	,,	2	2	Do. 2nd 4 p.c. Deb.... ...	101 —104
328,790	,,	2½	2½	Do. 5 p.c. Deb.	118 —120
157,150	Aug. 6	3½	2½	Chester 5 p.c. Ord.	120 —124
52,500	June 17	2	2	Do. 4 p.c. Cum. Pref. ...	101 —103
40,000	,,	2	2	Do. 4 p.c. Non. Cum. Pref.	100 —102
36,430	,,	1¾	1¾	Do. 3½ p.c. Deb.	98 —102
41,890	,,	2	2	Do. 4 p.c. Red. Deb. ...	99 —101
542,270	Feb. 11	3	4½	Derby Cons.	132 —137
55,000	Dec. 17	2	2	Do. 4 p.c. Deb.	97 —102
40,000	Aug. 6	5½	5½	Exeter 10 p.c.	185 —195
10,000	July 29	5	5	Great Grimsby 'A' Ord. ...	170 —180
6,500	,,	5	5	Do. 'B' Ord. ...	170 —180
79,000	,,	5		Do. 'C' Ord. ...	160 —175
732,000	Aug. 26	2½	2	Hartlepool G. & W. Cn. & New	101½—103½
490,681	June 17	1⅝	1⅝	Liverpool 3½ p.c. Red. Deb. Stk.	98 —103
245,500	,,	2	2	Do. 4 p.c. Red. Deb. Stk.	101 —103
306,083	July 1	2	2	Do. 4 p.c. Deb.	100 —102
680,000	May 27	2½	2½	Do. 5 p.c. Red. Stk. ...	103 —108
20,000	Dec. 17	2½	2½	Long Eaton 5 p.c. Pref.	9 — 11
80,000	,,	2½	2½	Do. 5 p.c. Deb.	117 —122
2,430,267	Aug. 6	2½	2½	Newcastle and Gateshead Con.	23/9—24/3a
682,856	,,	2	2	Do. 4 p.c. Pref.	101 —103
776,706	July 1	1¾	1¾	Do. 3½ p.c. Deb.	101 —103½
250,000	,,	1¾	1¾	Do. 3½ p.c. Red. Deb. ...	98 100
73,186	Oct. 28	2	2	Do. 4 p.c. Red. Deb. ...	100½—102
106,280	Aug. 12	5	5	Preston 'A' 10 p.c.	186 —191
188,219	,,	3½	3½	Do. '8' 7 p.c.	143 —148
1,806,339	Feb. 28	3½	3½	Sheffield Cons.	132½—136½
95,000	July 8	2	2	Do. 4 p.c. Deb.	98 —102
332,351	Aug. 19	3	3	Sunderland 6 p.c. max.... ...	124 —126
192,150	Aug. 12	2½	2½	Weston-super-Mare Cons. ...	112 —114
64,338	July 1	2	2	Do. 4 p.c. Deb.	99 —101
33,340	,,	3⅜	3⅜	Do. 7½ p.c. Deb.	145 —150

a—The quotation is per £1 of Stock. † Per Year. ‡ Paid